FORM YRK3-EG1 (121)

YORK®
SINGLE PACKAGE ROOFTOP UNITS
ENGINEERING GUIDE

120–150 Tons

Cooling and Heating (Gas, Electric, Water, and Steam)

R-410A

Mod G

YORK®

INSTALL CONFIDENCE

Nomenclature

BASE MODEL NUMBER YPAL120–150

1 2 3 4 BASE PRODUCT TYPE
- Y : YORK
- P : Packaged Rooftop
- A : Air-Cooled
- L : Scroll

5 6 7 NOMINAL CAPACITY
- 1 2 0 : 120-ton
- 1 3 0 : 130-ton
- 1 5 0 : 150-ton

8 9 APPLICATION
- C : Cooling Only
- N : Natural Gas Heat
- G : Natural Gas Heat Stainless Steel Heat Exchanger
- M : Modulating Gas Heat
- E : Electric Heat
- S : Steam Heat
- H : Hot Water Heat
- V : VAV or SZVAV

10 REFRIGERANT
- E : R-410A

11 12 VOLTAGE
- 4 6 : 460 / 3 / 60
- 5 8 : 575 / 3 / 60

13 14 DUCT LOCATIONS
- B : Bottom Supply
- L : Left Supply
- R : Right Supply
- B : Bottom Return
- R : Rear Return
- S : Side Return

15 16 DESIGN SPECIAL
- G
- X : Standard Product, IPU
- S : Special Product, IPU

17 GAS HEAT CAPACITY
- N : No Gas Heat
- L : Low (375 mbh)
- M : Medium (750 mbh)
- H : High (1125 mbh)

Approvals

U.S. GREEN BUILDING COUNCIL MEMBER

C ETL US LISTED Intertek

ASHRAE 90.1 COMPLIANT

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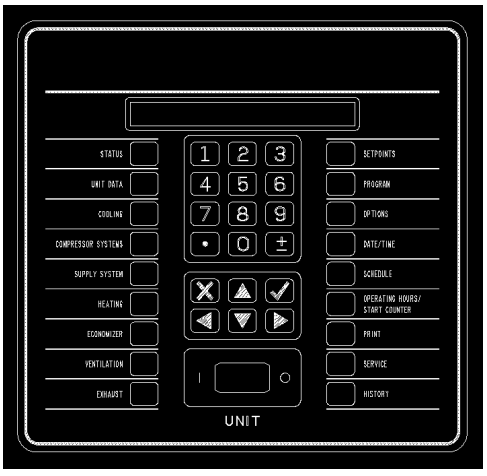
Introduction

The YORK® 120–150 Ton Single Package Rooftop Units – designed to meet the demands of the market for today and tomorrow.

Better Economy...

Lower total cost of ownership

- YORK provides a standard product offering that meets the latest ASHRAE 90.1 energy efficiency requirements.
- Unique compressor staging provides quick response to cooling needs and provides multiple steps of capacity for high part load efficiency.
- Fully modulating gas heat and greater steps of capacity control offer superior off-design performance while maintaining optimum occupant comfort.
- Accurate ventilation control ensures that no more than the proper amount of ventilation air is utilized. This avoids the energy cost of conditioning excess outside air and simultaneously monitors all other unit functions for maximized energy efficiency.
- Flexible design configurations simplify the design process and allows the YORK 120–150 ton rooftop unit to be applied to virtually any building application.
- Accessibility through double-wall access doors, spacious compartments and supportive floors improves serviceability.



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The single package unit user interface uses microprocessor logic to optimize operation of the rooftop unit.

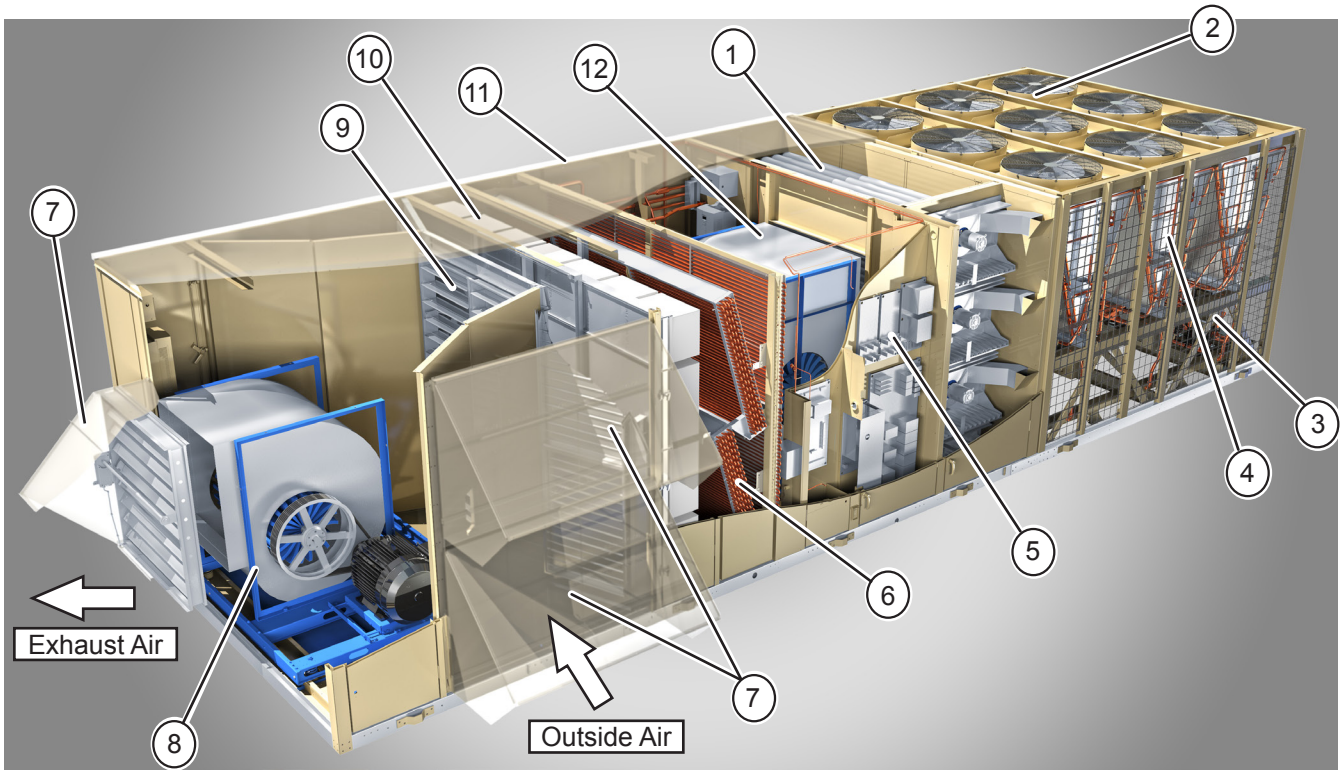
Better Ecology...

Indoor air quality (IAQ) features for the indoor environment

- A double-sloped stainless steel drain pan with a single drain connection ensures that all condensate is voided from the drain pan. It is also visible and accessible for periodic inspection and cleaning required by the ASHRAE 62 IAQ standard.
- Double-wall construction of the roof, floor, doors, and walls prevents insulation fibers from entering the conditioned air. The inner liner also facilitates periodic cleaning of the unit to prevent harmful build-up of bacteria or contaminants.
- The single package unit control center uses microprocessor logic to analyze and optimize ventilation decisions and perform demand ventilation, airflow compensation, and airflow measurement to maintain the air quality at a healthy level.

Patents

For access to rooftop unit related patents, visit: https//jcipat.com



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1. Modulating or staged gas heat
2. Condenser fans
3. Scroll compressors
4. Condenser
5. Advanced single package unit controller
6. Evaporator coil
7. Rain hoods
8. Exhaust/return fan
9. Economizer
10. Filters section
11. Double-wall construction
12. Double width, double inlet (DWDI) airfoil supply fan

FIGURE 1 - STANDARD CABINET ASSEMBLY

Features and Benefits

AIRFLOW CONFIGURATIONS

Variable Air Volume (VAV) – YORK® 120–150 ton rooftop units are available for variable air volume (VAV) applications. Control can be used with a zone sensor or building automation system (BAS). Supply fans are controlled to the supply duct static pressure setpoint, which can be reset via a BAS, or through a 0–5VDC analog input on the unit controller for optimized duct static pressure control. The static pressure transducer is provided in the single package unit, and 5/16-inch or 1/4-inch plastic tubing and static pressure sensor must be supplied by others and installed approximately 3/4 down the longest duct run.

Single Zone Variable Air Volume (SZVAV) – The 120–150 ton rooftop units are available for single zone variable air volume (SZVAV) applications. Control can be used with a zone sensor or a BAS. Supply fans are controlled based on zone temperature.

COOLING AND HEATING CONFIGURATIONS

Cooling Only – For applications where no heat is required, or heating is provided elsewhere within the building HVAC system, cooling only units include an empty discharge plenum. Supply duct connections are configurable for bottom, left or right discharge. The supply air temperature (SAT) sensor is included and factory-installed.

Staged Gas Heat – For applications requiring gas heat for morning warm-up, or other heating needs, a staged natural gas furnace is available. The furnace is located in the discharge plenum, downstream of the supply fan. The SAT sensor is located across the face of the supply duct opening in the unit. Furnaces are designed in 375 mbh modules. Three stages are available for the YPAL120–150. Ignition and safety controls are included and factory-wired. Units with staged gas heat are ETL listed.

Modulating Gas Heat – For applications requiring gas heat for morning warm-up, supply air tempering or other heating needs, a modulating natural gas furnace is available for finer temperature control. The furnace is located in the discharge plenum, downstream of the supply fan. The SAT sensor is located across the face of the supply duct opening in the unit. Furnaces are designed in 375 mbh modules in 8:1 turndown increments. Three are available for the YPAL120–150 (8:1, 16:1 or 24:1 turndown). Ignition and safety controls are included and factory-wired. Units with modulating gas heat are ETL listed.

Electric Resistance Heat – For applications where electric heat is desired, a slip-in electric resistance heat element is available in sizes from 80–250 kW depending on the single package unit model size. The number of stages varies by size and voltage, but all have a minimum of two stages of capacity. Units with electric heat are ETL listed.

Hot Water Heat – For applications where hot water is available for heating, a hot water heating coil is available. A range of coil fin count selections are available to properly size the heating for the application. Units with hot water heat are ETL listed.

Steam Heat – For applications where steam is available for heating, a steam heating coil is available. A range of coil fin count selections are available to properly size the heating for the application. Units with steam heat are ETL listed.

Features and Benefits (Cont'd)

POWER OPTIONS

Single-Point Supply with Terminal Block – This configuration is standard, and includes three terminals for the incoming 3-phase power and is the standard configuration for the 120–150 ton rooftop product. It includes the enclosure, terminal-block, and interconnecting wiring to the compressors, heater and furnace controls, all fans, etc. In this configuration, code requires that a means of disconnect (not provided) must be installed at the site within line-of-sight of the equipment.

Single-Point Supply with Non-Fused Disconnect Switch – This option is the same as the single-point with terminal block option except it includes a unit-mounted through-the-door manual non-fused disconnect switch with an external, lockable handle (in compliance with Article 440-14 of National Electric Code (NEC)). This option provides a means to isolate the unit power voltage for servicing. Others must supply separate external fusing which must comply with the NEC and/or local codes.

Dual-Point Supply with Terminal Block – This option includes enclosure, terminal blocks circuited to the supply and exhaust fans and control transformer, and a second set of terminal blocks with interconnecting wiring to the compressors, heat (if applicable), and condenser.

Convenience Outlet – This options includes a powered 115V GFCI convenience outlet that can be used for powering tools or lights for servicing. A protective cover plate is included while not in use. The outlet is located on the bottom left hand corner of the power panel.

CONTROL FEATURES AND OPTIONS

Microprocessor-Based Single Package Unit Controller – All 120–150 ton rooftop units are equipped with a factory-installed, programmed and commissioned unit controller with all I/O capabilities and control sequences. The controls include all on-board diagnostic, safety and control features to operate the single package unit. A multimedia card interface is included for software upgrades and can be used for data logging to simplify equipment troubleshooting. Communication ports are included as standard with three alarm outputs, a shutdown contact, remote start/stop input, smoke ventilation controls, analog inputs for SAT and duct static pressure reset, along with a variety of other capabilities.

Standard Ambient – YPAL120–150 models operate down to 50.0°F as standard.

Low Ambient – This option includes low ambient control of all three refrigerant circuits down to 0.0°F through the use of suction and discharge pressure transducers, as well as condenser fan speed using a variable frequency drive (VFD) on the first condenser fan of each circuit.

Pressure Transducers with Readout Capability – This option includes suction and discharge pressure transducers on each circuit and provides pressure readout of all circuits at the unit control panel.

Wall-Mount Zone Sensor – A 10 kOhm thermister type III NTC zone sensor for wall mounting. This zone sensor is for sensing temperature only and does not include any setpoint adjustment features.

Zone Sensor

COMMUNICATIONS

BACnet® MS/TP (RS-485) Communications – This communication option is standard on every rooftop unit. Communications to the unit are through a twisted pair, and the wire terminations are on the primary unit control board. See supplemental information for the available control points and protocol implementation conformance statement (PICS)/ BACnet® interoperability building blocks (BIBBs) statements of conformity.

Modbus™ Remote Terminal Unit (RTU) Communications – This communication option is standard on every rooftop unit and can be used in lieu of the BACnet communications (only one can be used at a time). See supplemental information for the available control points.

FILTER OPTIONS

Filter Options – Cleanable, carbon coated MERV 7 or pleated MERV 8 filters in an angled rack are available. For higher filtration requirements, optional rigid filter racks are available with 12-inch 65% MERV 11 or 95% MERV 14 efficient rigid filters. Two-inch prefilters are included with rigid filter options. The rigid filter rack option is available without filter media where field-supplied filters are required.

OUTSIDE AIR DAMPER (OA) OPTIONS

Manual Damper – This option includes a manually adjustable outside air (OA) damper. It is manually adjustable at the unit by setting a mechanical stop between 0–100%.

Two-Position – This OA damper option is controlled to two positions, opened and closed. Determination of the damper position is based on the occupancy schedule. In the occupied mode, the OA damper is positioned to the manually configured point (set by mechanical stop). In the unoccupied mode, the damper is fully closed.

Modulating Economizer – This option includes modulating OA and return air (RA) dampers that are software interlocked and positioned by fully modulating, solid state damper actuators. Control of the damper is via a standard ambient OA dry bulb sensor, or optional single or comparative enthalpy controls.

Airflow Measurement – Optional outside airflow measurement is available on units equipped with a modulating economizer.

CO_2 Sensors – Optional carbon dioxide (CO_2) sensors for occupied space that operate demand ventilation control opening OA dampers to ventilate building. The CO_2 sensors can operate in a single or comparative control scheme.

Rain Hoods on Outside Air (OA) Intakes – For all options with OA intake openings, rain hoods are provided as standard to keep moisture from entering the equipment. The rain hoods are an integral part of the unit and are rotated into place at the job site.

RELIEF SYSTEM

Barometric Relief – Optional building air exhaust shall be accomplished through barometric relief dampers installed in the return plenum. The dampers will open relative to the building pressure. The opening pressure shall be adjustable via a spring tension adjustment.

On/Off Powered Exhaust – This option provides simple building pressure control. It can be controlled via a building pressure signal, or via OA damper control. ***This option is not available for VAV units***.

Modulating Powered Exhaust with Damper Control – This option consists of a constant-speed exhaust fan with a discharge damper that is modulated to control the flow of exhaust air. The damper control logic is based on the building static pressure setpoint within the single package unit controller. The static pressure transducer is provided in the return plenum of the single package unit, and 5/16-inch or 1/4-inch plastic tubing and static pressure sensor must be supplied by others and installed in a representative location in the building.

Features and Benefits (Cont'd)

Modulating Powered Exhaust with a VFD – This option consists of a VFD to modulate the speed of the exhaust fan to control the flow of exhaust air. The VFD control logic is based on the building static pressure setpoint within the single package unit controller. The static pressure transducer is provided in the return plenum of the single package unit, and 5/16-inch or 1/4-inch plastic tubing and static pressure sensor must be supplied by others and installed in a representative location in the building.

Powered Return Fan with Exhaust – This option uses single width, single inlet (SWSI) plenum fan(s) to control building pressure. The fan motors are driven by a VFD to maintain a constant return plenum pressure. An exhaust hood with a modulating control damper is used to maintain building pressure via the building static pressure. The static pressure transducer is provided in the return plenum of the single package unit, and 5/16-inch or 1/4-inch plastic tubing and static pressure sensor must be supplied by others and installed in a representative location in the building. The powered return fan is also available without the exhaust capabilities. For units with no exhaust capabilities, the HVAC system must provide alternate means of controlling building pressure.

Belt Guards – Belt guards shall be provided as a safeguard on belt driven fans while servicing the fan section.

Airflow Measurement – Optional piezorings for exhaust/return fan airflow measurement are available for integration with field supplied controller.

SUPPLY FAN OPTIONS

Double Width, Double Inlet (DWDI) Airfoil Supply Fan – The standard airfoil blade supply fan is available on all models for higher static conditions. This offers higher efficiency and lower sound in certain applications.

Fan Skid Isolation – The entire supply fan assembly is isolated from the unit base with either 1-inch (standard) or 2-inch deflection springs with seismic restraints.

Supply and Exhaust Fan Motors – Premium efficiency open drip-proof (ODP) and premium efficiency total enclosed fan-cooled (TEFC) motors are available all meeting the Energy Policy Act of 1992 (EPACT).

Supply Fan VFD and Manual Bypass – For VAV applications, VFDs are provided to modulate air flow. Optional manual bypass can also be provided to allow full airflow in the event of a VFD failure.

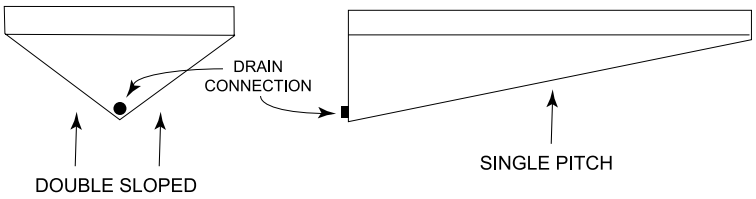
Belt Guards – Belt guards shall be provided as a safeguard on belt driven fans while servicing the fan section.

Airflow Measurement – Optional piezoring for supply fan airflow measurement is available for integration with field supplied controller.

Direct Drive Plenum (DDP) Fan – A direct drive plenum (DDP) supply fan provides outstanding reliability and efficiency, eliminating the possibility of conditioned air supply interruption due to a broken belt and the pollution of conditioned air with belt dust. The supply fan can be optionally equipped with a piezo ring to precisely measure the amount of air delivered to the conditioned space. The speed of the supply fan is controlled by a VFD.

EVAPORATOR SECTION

Double Sloped Stainless Steel Drain Pan – The stainless steel drain pan is factory-mounted and installed on every unit. A condensate drain trap is needed and must be provided and installed in the field by others.



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***NOTE:**
This is a visual reference only. Actual drain pan pitch will vary.

FIGURE 2 - DRAIN PAN DETAIL

Double-Wall Construction – Double-wall construction is the standard construction of the 120–150 ton rooftop unit and incorporates powder coated pre-fabricated outer panels and corner post for maximum exterior surface protection.

Factory Shrink-Wrap – All 120–150 ton single package rooftop units are shipped from the factory with factory-fresh shrink-wrap packaging. No longer does the contractor need to worry about dirt and debris clogging up condenser coils or moisture leaking into the air handler on the units way to the job site or rigging yard.

Copper Fins – For more extreme climates that aggressively can attack aluminum, copper tube evaporator coils with copper fins are available. (This is not recommended for units in areas where they may be exposed to acid rain or environments where ammonia is present.)

CONDENSER FEATURES AND OPTIONS

Scroll Compressors – Reliable, efficient, trouble-free operation is the true measure of a single package unit's value. That's why 120–150 ton single package rooftop units use established scroll compressor technology to deliver dependable, economical performance in a wide range of applications. With the 120–150 ton single package rooftop units, you get the latest generation of compressor enhancements added to the scroll's inherent strengths. The simplicity of a hermetic scroll compressor allows the use of fewer moving parts to minimize breakdown.

Compressor Circuiting – The unit is designed so that only two scroll compressors are in tandem within one refrigeration circuit. This means more reliable compressors, and less equipment down time. With multiple circuits, if a compressor should ever fail on one circuit, the other circuit/s will remain operational to work to maintain occupied loads. The unit system has three circuits in a unit.

Compressor Staging - The unit refrigeration system is equipped with a unique staging algorithm. On first call for cooling the system calculates the amount of cooling capacity needed by the space and automatically brings on enough cooling capacity to meet this calculated need. Comfort cooling is provided quickly without the lag inherent to staging on additional compressors to meet a high demand. Additionally, due to a three independent circuit design with two compressors on each circuit, the rooftop unit can provide superior granularity in terms of staging, which translates to best in class part load efficiency or IEER.

Condenser Fan Motors – The condenser fan motors used on the unit are totally enclosed air over (TEAO) to provide maximum durability through any season.

Replaceable Core Liquid Line Driers – Liquid line driers are standard on the single package rooftop unit.

Features and Benefits (Cont'd)

Post-Coated Condenser Coil Fins – Technicoat coil-coating process used on condenser coils for seashore and other corrosive applications (with the exception of strong alkalis, oxidizers, wet bromide, chlorine, and fluorine in concentrations greater than 100 ppm).

Compressor Sound Blankets – Optional compressor acoustic sound blankets are available for sound sensitive applications.

ROOF CURBS

Full Perimeter Roof Curbs – This option includes a knock-down 14-inch high roof curb for use with wood nailer (by others). Roof curb supports the entire perimeter of the unit.

Partial Perimeter Roof Curbs – This option includes a knock-down 14-inch high roof curb for use with wood nailer (by others). Roof curb supports the air handling section with a separate support under the condenser end.

CABINET FEATURES AND OPTIONS

Double-Wall Access Doors - Full-sized access doors provide easy access into the unit for routine maintenance and inspection. Solid wall liners encase insulation and prevent damage and erosion into the airstream.

Diffuser Section – An optional diffuser section is available downstream of the supply fan in the extended discharge plenum cabinet option. The diffuser section distributes the airflow from the fan evenly across the downstream filter bank to optimize filter life and effectiveness. The diffuser design is optimized to provide uniform flow at minimal airside pressure loss.

Downstream Final Filter Rack – A 90–95% efficient MERV 14, 12-inch rigid filter rack and filters shall be provided downstream of the supply fan and diffuser segment for hospital applications. A magnahelic pressure gauge is included and visible from the outside of the unit for servicing and code compliance.

Blank Section – A blank section shall be provided downstream of the supply fan and diffuser section.

ACCESSORIES

Seismic Certification – For applications requiring seismic certification, the rooftop unit shall be tested and certified to meet the seismic standards of the 2012 International Building Code and ASCE 7-06.

Filter Switch – An optional dirty filter alarm is available on the upstream and downstream filter racks that will provide an alarm when the filters require cleaning.

Magnahelic Filter Pressure Gauge – On units equipped with downstream filtration, a standard magnehelic gauge is included and an option is provided for upstream filtration. The gauge is mounted on the exterior of the unit. The filter gauge measures the air pressure drop across the filter bank to indicate when replacement is required.

Exhaust & return fans
- Horizontal return for all configurations
- Double width, double inlet (DWDI) centrifugal exhaust fans
- Single width, single inlet (SWSI) plenum return fans
- Variable frequency drive (VFD) options

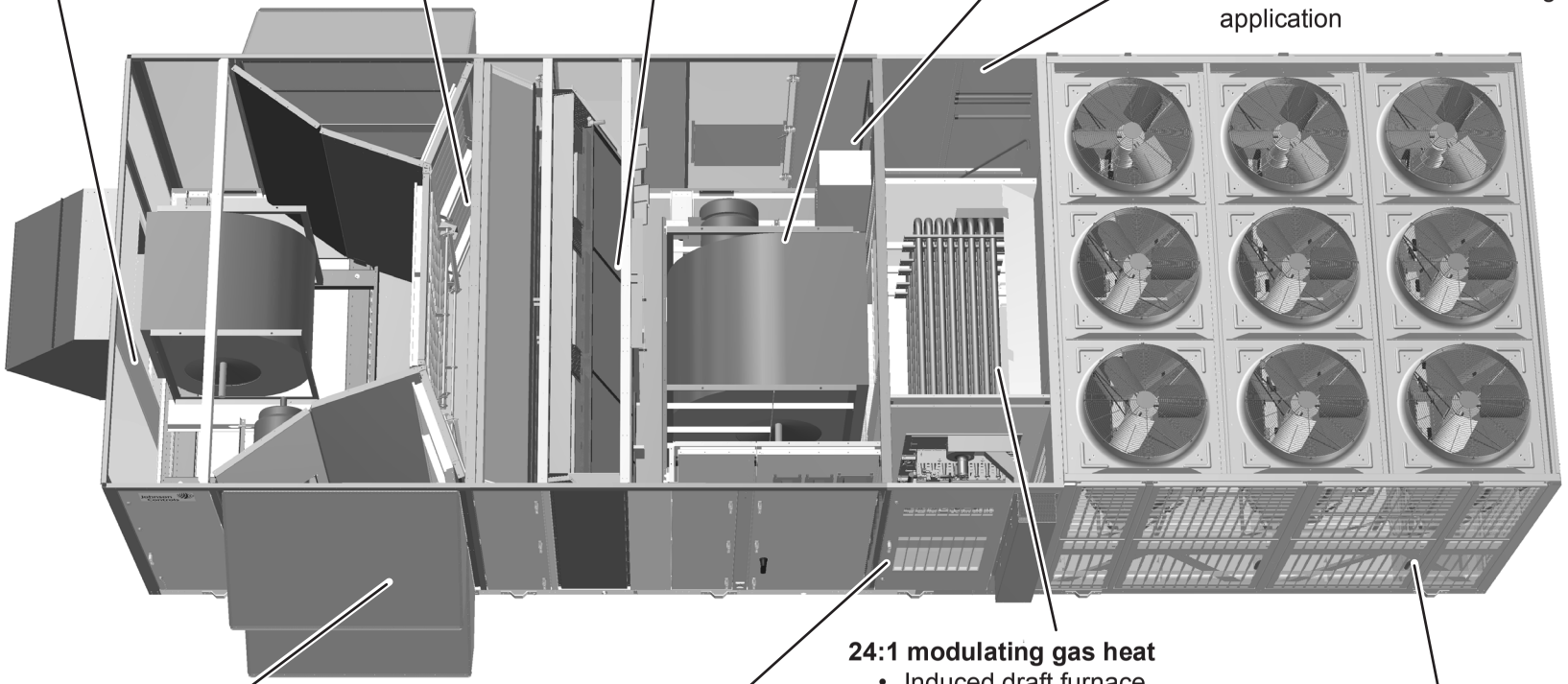
Evaporator
- Angled coil to reduce risk of carryover
- Standard stainless steel drain pan

Single supply fan
- Eliminates stratification
- Fewer moving parts
- Solid steel shaft
- Isolated assembly
- Laser aligned and balanced

Blower variable frequency drives (VFDs)
- Located in conditioned space
- Remote keypad in control section
- In filtered air stream to prevent dust and dirt build-up

Mixing box
- OA from two sides
- Facilitates mixing

Side discharge with heat
- Does not require an elevated structure or curb
- Flexible solution for building application



Collapsible outside air (OA) hoods
- Collapsible for shipping to reduce freight
- Single piece shipment
- Fast and easy setup

Advanced single package unit controller
- Multimedia card for updates (no EPROM)
- Multimedia card used for data logging
- Integrated YORK® ISN ConneXsys™ control solution
- Standard BACnet® MS/TP and Modbus™ communications

24:1 modulating gas heat
- Induced draft furnace
- Accepts gas pressures down to 4.5-inches
- Six-stage base design

Shared-fan design
- Standard low ambient to 0.0°F
- Control to discharge pressure
- Quiet part load operation

Application Data

GENERAL

The YORK® 120–150 ton rooftop units are designed for outdoor installation. When selecting a site for installation, be guided by the following conditions:

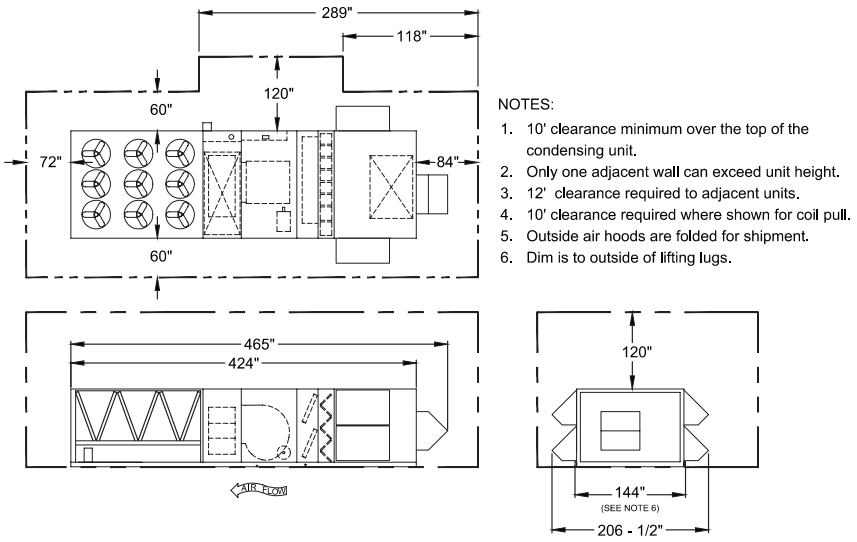
- Unit must be installed on a level surface.
- For the outdoor location of the unit, select a place having a minimum sun exposure and an adequate supply of fresh air for the condenser.
- Also avoid locations beneath windows or between structures.
- Optional condenser coil protection should be used for seashore locations or other harsh environments.
- The unit should be installed on a roof that is structurally strong enough to support the weight of the unit with a minimum of deflection. It is recommended that the unit(s) be installed not more than 15 feet from a main support beam to provide proper structural support and to minimize the transmission of sound and vibration. Ideally, the center of gravity should be located over a structural support or building column.
- Location of unit(s) should also be away from building flue stacks or exhaust ventilators to prevent possible reintroduction of contaminated air through the outside air intakes.
- Be sure the supporting structures will not obstruct the duct, gas or wiring connections.
- Proper service clearance space of 6 feet around the perimeter of the unit, 8 feet on one side for coil servicing, and 12 feet to any adjacent units is required to eliminate cross contamination of exhaust and outside air, and for maintenance tasks such as coil pull and cleaning. No obstructions should be above the condensing unit section.

LOCATION

Of the many factors that can effect the location of equipment, some of the most important to consider are structural, acoustical and service clearances. Proper attention should be made at the design stage to ensure proper structural support. In cases where equipment is being replaced, be aware of building design to ensure support is adequate for the application.

The next most important consideration in applying single package units equipment is that of sound from the equipment. Special care should be made to keep the single package unit away from sound sensitive areas such as conference rooms, auditoriums and executive offices and any other room that may have potential for tenant occupancy. Possible locations could be above hallways, mechanical or utility rooms.

Finally, service clearances should be maintained in single package unit design to ensure safe access to the unit. Unit clearances are designed so that technicians have enough space between units, building walls, and edges of building to gain access safely. In cases where space is limited, please call a local YORK representative for additional information.



NOTES:
1. 10' clearance minimum over the top of the condensing unit.
2. Only one adjacent wall can exceed unit height.
3. 12' clearance required to adjacent units.
4. 10' clearance required where shown for coil pull.
5. Outside air hoods are folded for shipment.
6. Dim is to outside of lifting lugs.

RIGGING

Proper rigging and handling of the equipment is mandatory during unloading and setting it into position to retain warranty status.

Spreader bars must be used by cranes to prevent damage to the unit casing. All lifting lugs must be used when lifting the single package unit. Fork lifts will damage the single package unit and are not recommended.

Care must be taken to keep the unit in the upright position during rigging and to prevent damage to the watertight seams in the unit casing. Avoid unnecessary jarring or rough handling.

UNIT PLACEMENT

- **Elevated** – Elevated roof curbs or dunnage steel can be used to support the unit in order to raise it to specific heights. When this type of placement is required, be sure to keep unit access in mind. Cat walks or other forms of unit access may be required to one or both sides of the unit, depending on your area of the country and the local codes that are enforced. Please check with local officials to ensure the application conforms to local codes and regulations.

- **Ground Level Locations –** It is important that the units be installed on a substantial base that will not settle, causing strain on the refrigerant lines and sheet metal and resulting in possible leaks. A one-piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should be isolated from the main building foundation to prevent noise and vibration transmission to the building structure.

  For ground level installations, precautions should be taken to protect the unit from tampering by, or injury to, unauthorized persons. Erecting a fence around the unit is common practice.

- **Roof curb –** YORK offers optional roof curbs designed specifically for the 120–150 ton rooftop unit footprint. These curbs come in full perimeter or open condenser models and are shipped disassembled and require field assembly and installation. For bottom supply and return openings, the curbs have matching connections to ease installation. A pipe chase that matches the single package unit pipe chase is also included in the curb footprint for through-the-curb utility connections.

Application Data (Cont'd)

The curb should be located according to the location recommendations above, and properly sealed to prevent moisture and air leakage into and out of the duct system. Flexible collars should be used when connecting the ductwork to prevent unit noise transmission and vibration into the building.

Ductwork should be supported independently of the unit.

TABLE 1 - SUPPLY AIR DUCT CONN CONFIGURATIONS

UNIT CONFIGURATION		SUPPLY AIR		
		BOTTOM	LEFT	RIGHT
YPAL 120–150	STANDARD CABINET			
	Cooling only	X	X	X
	Cool/electric heat	X		
	Cool/gas heat	X	X	
	Cool/hydronic heat	X		
	EXTENDED CABINET			
	Cooling only	X	X	X
	Cool/hydronic heat	X	X	X

TABLE 2 - RETURN AIR DUCT CONNECTION CONFIGURATIONS

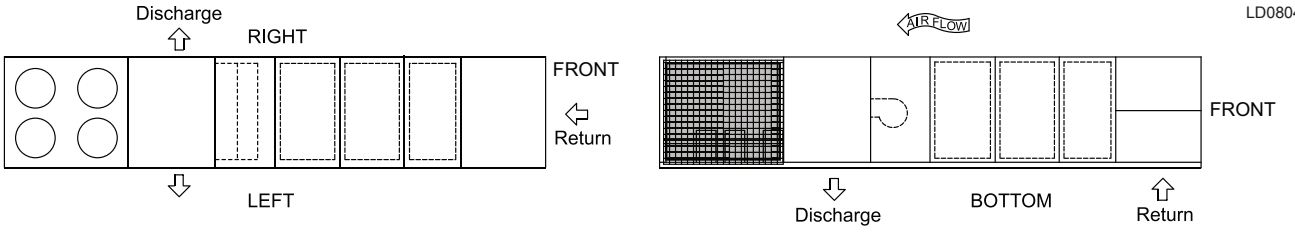
UNIT CONFIGURATION		RETURN AIR	
		BOTTOM	FRONT
YPAL 120–150	No exhaust	X	X
	Barometric relief damper	X	X
	Powered exhaust fan (all types)	X	X
	Powered return fan	X	

UNIT ORIENTATION

For applications with multiple single package units located in close proximity on the roof, the orientation of the unit may be important to reduce the potential for re-entrainment of outside airflow. Regardless of the outside air and exhaust air openings on a unit, all single package unit applications can permit recirculation of exhaust air to the return, if applied improperly.

HORIZONTAL APPLICATIONS

The spectrum of applications for single package units in today's market is continuing to grow wider by the day. Flexibility in unit design and construction is a must in today's market in order to ensure safe and sound applications of HVAC equipment. The rooftop unit has been designed for specific application of horizontal supply and return airflow taking the guess work out of unit application by building a unit specific to these needs. If the application calls for horizontal supply and return air, YORK can ship it from the factory as a horizontal unit. This option eliminates the need for field modification of equipment saving time and money. The unit can support a left discharge on all units except electric heat and/or right discharge on all cooling only units and hydronic heat units with an extended cabinet. Return air can be brought through the front or bottom return air inlet making the unit specific to building needs.



NOTE: This diagram is provided as a visual reference of the YORK 120–150 ton rooftop discharge air (DA) & return air (RA) openings & locations for all sizes. Please refer to the dimensional data for exact size & location of panels and openings.

ECONOMIZER

The economizer section is used for ventilation of the conditioned space to maintain indoor air quality (IAQ), and also to reduce energy consumption by using outside air cooling in lieu of mechanical cooling. If outside air is appropriate for cooling, but not sufficient for the cooling demand, mechanical cooling will stage on as necessary until the cooling load is met.

Dual (comparative or differential) enthalpy operation is the most accurate and efficient means of economizer operation. The IPU controller monitors the return and outside air energy content, and selects the lower of the two for operation.

VARIABLE AIR VOLUME (VAV) SUPPLY AIR PRESSURE CONTROL

Traditional single package unit systems use inlet guide vanes (IGVs) for duct static pressure control. These control supply duct pressure by modulating dampers (introducing losses and inefficiencies) on the inlet of the fan, open and closed. YORK variable frequency drives (VFDs) offer superior fan speed control and quieter, energy efficient operation.

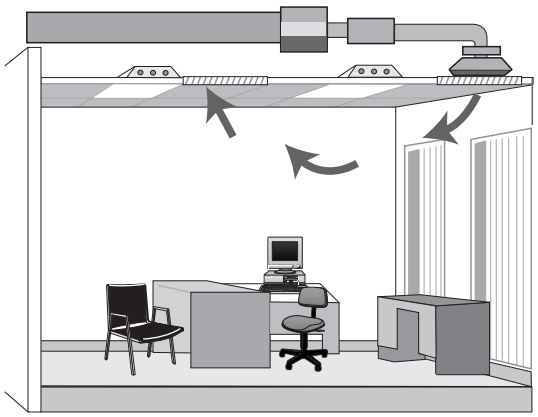


FIGURE 3 - TRADITIONAL OVERHEAD VARIABLE AIR VOLUME (VAV) AIR DELIVERY SYSTEM

For variable air volume (VAV) applications, the rooftop unit uses a VFD to modulate fan speed and maintain a constant duct static pressure. VFDs offer superior control over the operation of the unit at part load, and offer the additional benefits of quieter and more efficient operation when compared to IGV.

BUILDING PRESSURE CONTROL SYSTEMS

Building pressure control systems are often necessary when economizers are used to bring in outside air. Without proper building exhaust, the building may become over pressurized. The pressure control system maintains the proper building pressure by expelling the appropriate amount of air from the building.

Application Data (Cont'd)

Return fans – For high return static applications, such as buildings with ducted return systems, a powered return fan may be necessary to maintain building pressure control. YORK 120–150 ton rooftop units offer a powered return fan that is located in the return plenum. This fan operates coincidentally with the supply fan and draws return air back through the return ductwork and into a pressurized plenum. A control damper modulates to exhaust air out of the building and maintain the building pressure. A second control damper modulates to provide return air from the ductwork to the unit to the single package air mixing section.

The return fan configuration is available in two forms: with and without an exhaust damper. The option with the exhaust damper provides a means of building exhaust at the unit. In some applications, the exhaust system is located elsewhere and the single package unit is not required to provide building exhaust. In these situations, the unit can be offered without the exhaust damper to help reduce installed costs.

Exhaust/relief fans – In this application, a powered exhaust fan may be suitable, however careful consideration of the fan type is necessary. YORK offers a centrifugal powered exhaust fan to perform this function. Some manufacturers use a propeller exhaust fan, which cannot handle the static pressure requirements.

For systems with moderate to low return static pressure, an exhaust fan is recommended. The benefit of the exhaust fan is that it does not run all of the time, and may facilitate compliance with the ASHRAE 90.1 fan motor horsepower requirement.

The exhaust fan operates in parallel with the supply fan. In this arrangement, the supply fan handles the full static pressure requirements of the system. For normal building pressure control, the exhaust fan operates to draw air from the return plenum and exhaust it out of the building.

The exhaust fan configuration is available in two forms, modulating and non-modulating. Modulating is the most common and recommended for the majority of applications, while non-modulating should be used in only certain circumstances.

In the modulating exhaust system, the volume of airflow exhausted from the building is proportional to the entering volume of outside air. Control is accomplished via either a discharge damper or a VFD. YORK recommends the use of a VFD to reduce energy consumption, sound levels and improved reliability due to fewer moving parts.

In the non-modulating exhaust system, the exhaust airflow is constant whenever the exhaust fan is operating. This type of control should only be used to either assist a smoke purge system or when a system requires a constant volume of exhaust airflow.

ACOUSTICAL CONSIDERATIONS

The 120–150 ton rooftop unit is designed for lower sound levels than competitive units by using flexible fan connections, fan spring isolators, double-wall construction, multiple fan options, and lower speed and horsepower fans. For VAV applications, VFDs are used instead of inlet guide vanes. Additional sound attenuation can be obtained using compressor sound blankets when necessary.

Even with these equipment design features, the acoustical characteristics of the entire installation must never be overlooked. Additional steps for the acoustical characteristics of a single package unit installation should be addressed during the design phase of a project to avoid costly alterations after the installation of the equipment. During the design phase of a project, the designing engineer should consider, at a minimum, the impact of the equipment location, single package unit installation, building structure, and ductwork.

Physical Data

TABLE 3 - PHYSICAL DATA – MODELS 120–150

MODEL SIZE	120	130	150
COMPRESSOR DATA			
Quantity/Size (nominal HP)	4x15/2x25	2x15/2x20/2x25	2X15/2X20/2X32
Type	Scroll	Scroll	Scroll
Capacity Steps	14 steps providing capacity control between 12 and 100%		
DOUBLE WIDTH, DOUBLE INLET (DWDI) AIRFOIL SUPPLY FAN AND DRIVE			
Quantity	1	1	1
Size	40	40	40
Motor Size Range (min. to max. HP)	10–100	10–100	10–100
Airflow Range (min. to max. CFM)	30000–52000	32000–52000	36000–52000
Static Pressure Range (min. to max. ESP)	0–6 inches	0–6 inches	0–6 inches
DIRECT DRIVE PLENUM (DDP) SUPPLY FAN AND DRIVE			
Quantity	2	2	2
Size	330-100/120	330-100/120	330-100/120
Motor Size Range (min. to max. HP)	10–60	10–60	10–60
Airflow Range (min. to max. CFM)	30000–45000/52000	30000–45000/52000	30000–45000/52000
Static Pressure Range (min. to max. ESP)	1–8 inches	1–8 inches	1–8 inches
EXHAUST FAN			
Quantity	1	1	1
Type	DWDI Forward-Curved		
Size	32–32	32–32	32–32
Motor Size Range (min. to max. HP)	7.5–60	7.5–60	7.5–60
Airflow Range (min. to max. CFM)	0–50000	0–50000	0–50000
Static Pressure Range (min. to max. ESP)	0–2 inches	0–2 inches	0–2 inches
RETURN FAN			
Quantity Fans/Motors	1	1	1
Type	SWSI Plenum	SWSI Plenum	SWSI Plenum
Size	445	445	445
Motor Size Range (min. to max. HP)	10–50	10–50	10–50
Airflow Range (min. to max. CFM)	0–50000	0–50000	0–50000
Static Pressure Range (min. to max. iwg)	0–3	0–3	0–3
EVAPORATOR COIL			
Size (sq. ft.)	81.7	81.7	81.7
Number Of Rows/Fins Per Inch	5 / 10	5 / 10	5 / 10
Tube Diameter (inches)	1/2	1/2	1/2
CONDENSER COIL			
Size (sq. ft.)	262	262	262
Number Of Rows/Fins Per Inch	1/21	1/21	1/21
CONDENSER FANS			
Quantity	9	9	9
Type	Prop	Prop	Prop
Diameter (inches)	36	36	36
Power (HP)	2	2	2
FILTERS - 2-INCH CLEANABLE (PRE-FILTER POSITION)			
Quantity	36/12	36/12	36/12
Size (length x width in inches)	16x20/20x20	16x20/20x20	16x20/20x20
Total Filter Face Area (sq. ft.)	113.3	113.3	113.3
FILTERS - 2-INCH PLEATED, 30% EFFICIENT (PRE-FILTER POSITION) (MERV 8)			
Quantity	36/12	36/12	36/12
Size (length x width in inches)	16x20/20x20	16x20/20x20	16x20/20x20
Total Filter Face Area (sq. ft.)	113.3	113.3	113.3

Physical Data (Cont'd)

TABLE 3 – PHYSICAL DATA – MODELS 120-150 (CONT'D)

MODEL SIZE		120	130	150
FILTERS - 2-INCH CARBON (PRE-FILTER POSITION) (MERV 7)				
Quantity		36/12	36/12	36/12
Size (length x width in inches)		16x20/20x20	16x20/20x20	16x20/20x20
Total Filter Face Area (sq. ft.)		113.3	113.3	113.3
FILTERS - 12-INCH RIGID 65%, 2-INCH 30% PREFILTER (PRE-FILTER POSITION) (MERV 11)				
Quantity		7/21	7/21	7/21
Size (length x width in inches)		20x16/20x25	20x16/20x25	20x16/20x25
Total Filter Face Area (sq. ft.)		88.5	88.5	88.5
FILTERS - 12-INCH RIGID 95% (FINAL FILTER POSITION) (MERV 14)				
Quantity		5/3/3/4/6/7	5/3/3/4/6/7	5/3/3/4/6/7
Size (length x width in inches)		12x24,16x20	12x24,16x20	12x24,16x20
		16x25, 20x20	16x25, 20x20	16x25, 20x20
		20x24, 20x25	20x24, 20x25	20x24, 20x25
Total Filter Face Area (sq. ft.)		80.4	80.4	80.4
GAS FURNACE				
Staged Furnace Sizes (input/output/stages)		1125 mbh/900 mbh/6 stages		
Gas Pressure Range (min. to max. iwg)	Natural	4.5–10.5 inch w.c.	4.5–10.5 inch w.c.	4.5–10.5 inch w.c.
	Propane	11.0–13.0 inch w.c.	11.0–13.0 inch w.c.	11.0–13.0 inch w.c.
Modulating Furnace Sizes (input/output/turndown)		1125 mbh/900 mbh/24:1 turndown		
Gas Pressure Range (min. to max. iwg)	Natural	4.5–10.5 inch w.c.	4.5–10.5 inch w.c.	4.5–10.5 inch w.c.
	Propane	11.0–13.0 inch w.c.	11.0–13.0 inch w.c.	11.0–13.0 inch w.c.
ELECTRIC HEATERS				
Size Range (min. to max. kW)		80-250	80-250	80-250
Heating steps [1]		2-6	2-6	2-6
Minimum steps [1]		2	2	2
MINIMUM OUTSIDE AIR (OA)TEMPERATURE FOR MECHANICAL COOLING		50	50	50
LOW AMBIENT OPTION MIN. OA TEMP		0	0	0

NOTES

1. Electric heat steps and airflow range depends on voltage and size. Consult the air pressure drop tables for specific number of steps for a given voltage.

TABLE 4 - REFRIGERANT CHARGE DATA

	120	130	150
REFRIGERANT CHARGE (STD CABINET)			
SYS 1 - lb (kg)	41 (18.6)	41 (18.6)	41 (18.6)
SYS 2 - lb (kg)	73 (33.1)	82 (37.2)	77 (34.9)
SYS 3 - lb (kg)	97 (44.0)	98 (44.4)	106 (48.1)
REFRIGERANT CHARGE (EXTD CABINET)			
SYS 1 - lb (kg)	43 (19.5)	43 (19.5)	43 (19.5)
SYS 2 - lb (kg)	75 (34.0)	84 (38.1)	79 (35.8)
SYS 3 - lb (kg)	100 (45.4)	101 (45.8)	109 (49.4)
HOT GAS REHEAT (HGRH) REFRIGERANT CHARGE (STD CABINET)			
SYS 1 - lb (kg)	41 (18.6)	41 (18.6)	41 (18.6)
SYS 2 - lb (kg)	80 (36.3)	90 (40.08)	85 (38.5)
SYS 3 - lb (kg)	97 (44.0)	98 (44.4)	106 (48.1)
HGRH REFRIGERANT CHARGE (EXTD CABINET)			
SYS 1 - lb (kg)	43 (19.5)	43 (19.5)	43 (19.5)
SYS 2 - lb (kg)	82 (37.2)	92 (41.7)	87 (39.5)
SYS 3 - lb (kg)	100 (45.4)	101 (45.8)	109 (49.4)

Weight Data

TABLE 5 - APPROXIMATE BASE OPERATING WEIGHTS (LBS)

MODEL SIZE	120	130	150
SINGLE PIECE UNIT	18,238	18,847	18,938
TWO PIECE UNIT			
Air Handler Section	12,131	12,325	12,332
Condenser Section	6,096	6,510	6,597

NOTES:

- Weights above are total weight excluding the curb
- Standard cabinet
- Cooling only
- 60 HP supply fan with variable frequency drive (VFD)
- Comparative enthalpy economizer
- Barometric relief exhaust
- Bottom supply and return
- 2-inch pleated filters
- Condenser section wire guards
- Weights represent approximate operating weights and have a +/- 10% accuracy. To calculate weight for a specific configuration, contact a YORK sales representative.

TABLE 6 - COMPONENT WEIGHTS (LBS)

MODEL SIZE	120	130	150
CABINET, AIR HANDLING SECTION			
Sheet Metal (Note 1)		6,310	
Control Panel (Note 2)		705	
REFRIGERANT			
Refrigerant Charge (R-410A)	210	230	230
COMPRESSORS	826	1,661	1,738
CONDENSER ASSEMBLY			
Sheet Metal		2,477	
Coils		864	
Condenser Fans		90	
Condenser Motors		450	
Condenser Grills		90	
Wire Guards		266	
Louvered Panel Guards		432	
DWDI AIRFOIL SUPPLY FAN SKID WITHOUT MOTOR (NOTE 3)		1,696	
SUPPLY FAN MOTOR DRIVE		80	
DUAL DIRECT DRIVE PLENUM (DDP) FAN SKIDS WITHOUT MOTOR			
Frame 215T DDP 330-100/120		565/579	
Frame 254T DDP 330-100/120		584/597	
Frame 256T DDP 330-100/120			
Frame 284T DDP 330-100/120		608/621	
Frame 286T DDP 330-100/120			
Frame 324T DDP 330-100/120		692/705	
Frame 326T DDP 330-100/120			
Frame 364T DDP 330-100/120		709/722	
MOTOR (SUPPLY/EXHAUST/RETURN)			
7.5 HP		151	
10 HP		165	
15 HP		255	
20 HP		286	
25 HP		379	
30 HP		437	
40 HP		578	
50 HP		700	
60 HP		885	
75 HP		930	
100 HP		1,225	
VARIABLE FREQUENCY DRIVE (VFD) (SUPPLY/EXHAUST/RETURN)			
5–10 HP		16	
15–25 HP		27	
30–40 HP		51	
50–75 HP		77	
100 HP		110	

Weight Data (Cont'd)

TABLE 6 – COMPONENT WEIGHTS (LBS) (CONT'D)

MODEL SIZE	120	130	150
EVAPORATOR COILS	921	1,106	1,106
FILTERS			
2-inch Cleanable Aluminum		74	
2-inch Pleated		40	
2-inch Carbon		94	
Return Filter - 2-inch Throwaway (Note 4)		30	
Return Filter - 12-inch 60–65% (Note 4)		393	
Return Filter - 12-inch 90–95% (Note 4)		388	
Final Filters		327	
ECONOMIZER			
Outside Air Dampers		255	
Outside Air Hoods		291	
Outside Air Filters		103	
EXHAUST FAN SKID WITHOUT MOTOR		1,147	
RETURN FAN SKID WITHOUT MOTOR		1,574	
EXHAUST			
No Exhaust - End Panels		332	
Exhaust Fan (Damper and Hood)		516	
Return Fan (Damper and Hood)		539	
HEATING OPTIONS			
Electric Heat - 80 kW		660	
Electric Heat - 108 kW		680	
Electric Heat - 150 kW		700	
Electric Heat - 200 kW		720	
Electric Heat - 250 kW		740	
Gas Heat - 1125 mbh		1,455	
Hot Water Coil (2 rows x 14 fins per inch)		417	
Steam Coil (1 rows x 10 fins per inch)		534	
MISCELLANEOUS			
Open Perimeter Curb		684	
Enclosed Perimeter Curb		1,110	
Airflow Measurement Option		45	

NOTES:

1. Sheet metal, air handling cabinet cooling only.
2. Includes all options.
3. Motor base is included in fan skid.
4. Filters only. Does not include the filter rack.

Weights represent approximate operating weights and have a +/- 10% accuracy. To calculate weight for a specific configuration, contact a YORK sales representative.

Cooling Performance Data

TABLE 7 - COOLING PERFORMANCE DATA* – 120 TON MODEL

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 75.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1778.4	1080.0	1777.1	907.1	1773.2	732.3				
	71	1660.9	1202.8	1660.9	1031.4	1659.3	855.9	1659.3	674.7		
	67	1552.6	1325.4	1552.6	1155.3	1550.9	974.7	1550.9	797.9	1550.9	621.1
	62	1491.5	1443.6	1425.1	1309.3	1423.2	1126.8	1421.7	951.0	1420.2	775.1
34500	75	1802.4	1124.4	1800.2	935.7	1797.3	745.6				
	71	1684.4	1258.4	1684.0	1071.4	1682.8	879.6	1682.8	683.4		
	67	1587.6	1376.3	1586.2	1210.8	1584.9	1013.5	1584.9	822.0	1584.9	630.6
	62	1530.6	1488.1	1462.4	1355.8	1461.0	1183.4	1459.9	992.1	1458.7	800.8
37000	75	1826.5	1168.9	1823.4	964.3	1821.4	758.9				
	71	1707.9	1314.0	1707.0	1111.4	1706.2	903.3	1706.2	692.2		
	67	1622.5	1427.2	1619.8	1266.2	1618.9	1052.2	1618.9	846.1	1618.9	640.0
	62	1569.7	1532.6	1499.7	1402.3	1498.8	1240.0	1498.0	1033.3	1497.3	826.5
39500	75	1850.5	1213.4	1846.5	992.8	1845.5	772.2				
	71	1731.4	1369.5	1730.1	1151.3	1729.7	927.0	1729.7	700.9		
	67	1657.5	1478.0	1653.4	1321.7	1653.0	1091.0	1653.0	870.2	1653.0	649.5
	62	1608.8	1577.1	1537.0	1448.8	1536.5	1296.6	1536.2	1074.4	1535.8	852.2
42000	75	1874.6	1257.9	1869.6	1021.4	1869.6	785.5				
	71	1754.8	1425.1	1753.1	1191.3	1753.1	950.7	1753.1	709.6		
	67	1692.4	1528.9	1687.0	1377.1	1687.0	1129.7	1687.0	894.3	1687.0	658.9
	62	1648.0	1621.6	1574.3	1495.3	1574.3	1353.2	1574.3	1115.6	1574.3	877.9
44500	75	1889.9	1301.0	1886.2	1049.3	1885.6	797.6				
	71	1770.3	1479.3	1768.2	1229.8	1767.5	972.4	1767.5	717.1		
	67	1702.0	1551.9	1698.0	1424.0	1698.0	1159.6	1698.0	910.3	1698.0	660.9
	62	1679.4	1656.2	1597.8	1528.5	1572.1	1374.8	1571.1	1130.2	1570.1	885.7
47000	75	1905.3	1344.1	1902.8	1077.1	1901.6	809.6				
	71	1785.8	1533.5	1783.3	1268.3	1781.9	994.0	1781.9	724.5		
	67	1711.6	1575.0	1708.9	1470.9	1708.9	1189.5	1708.9	926.2	1708.9	662.9
	62	1710.8	1690.8	1621.4	1561.6	1569.9	1396.3	1567.9	1144.9	1565.8	893.5
49500	75	1920.6	1387.2	1919.3	1105.0	1917.5	821.7				
	71	1801.2	1587.6	1798.4	1306.7	1796.3	1015.7	1796.3	731.9		
	67	1721.2	1598.0	1719.9	1517.7	1719.9	1219.4	1719.9	942.2	1719.9	664.9
	62	1742.1	1725.4	1644.9	1594.8	1567.7	1417.9	1564.6	1159.5	1561.6	901.2
52000	75	1935.9	1430.3	1935.9	1132.8	1933.5	833.7				
	71	1816.7	1641.8	1813.5	1345.2	1810.7	1037.3	1810.7	739.4		
	67	1730.8	1621.0	1730.8	1564.6	1730.8	1249.3	1730.8	958.1	1730.8	666.9
	62	1773.5	1760.0	1668.4	1627.9	1565.5	1439.4	1561.4	1174.2	1557.3	909.0

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 7 – COOLING PERFORMANCE DATA* – 120 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 85.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1708.2	1052.4	1706.8	879.6	1702.1	704.6				
	71	1596.2	1175.4	1595.9	1004.0	1594.2	828.6	1594.2	647.4		
	67	1489.4	1296.6	1488.0	1126.1	1487.1	945.9	1487.1	769.1	1487.1	592.4
	62	1442.9	1407.3	1378.7	1286.1	1377.8	1104.2	1377.0	928.8	1376.3	753.5
34500	75	1731.2	1097.0	1729.6	908.4	1726.0	718.3				
	71	1618.4	1230.9	1617.9	1044.0	1616.7	852.4	1616.7	656.2		
	67	1525.2	1346.8	1510.0	1177.0	1509.4	980.0	1509.4	788.7	1509.4	597.4
	62	1462.6	1430.7	1414.5	1329.2	1394.3	1151.2	1393.7	960.4	1393.1	769.5
37000	75	1754.2	1141.6	1752.3	937.3	1750.0	732.1				
	71	1640.6	1286.5	1640.0	1084.1	1639.2	876.2	1639.2	665.1		
	67	1561.1	1397.0	1532.1	1227.9	1531.7	1014.2	1531.7	808.3	1531.7	602.3
	62	1482.4	1454.1	1450.3	1372.3	1410.8	1198.2	1410.4	991.9	1410.0	785.6
39500	75	1777.1	1186.1	1775.1	966.1	1773.9	745.8				
	71	1662.8	1342.1	1662.1	1124.1	1661.7	900.1	1661.7	674.0		
	67	1597.0	1447.2	1554.2	1278.8	1554.0	1048.4	1554.0	827.8	1554.0	607.3
	62	1502.1	1477.4	1486.1	1415.5	1427.3	1245.3	1427.1	1023.5	1426.9	801.7
42000	75	1800.1	1230.7	1797.8	995.0	1797.8	759.5				
	71	1685.1	1397.6	1684.2	1164.1	1684.2	923.9	1684.2	682.8		
	67	1632.9	1497.4	1576.3	1329.7	1576.3	1082.6	1576.3	847.4	1576.3	612.2
	62	1521.9	1500.8	1521.9	1458.6	1443.8	1292.3	1443.8	1055.1	1443.8	817.8
44500	75	1813.5	1273.6	1811.5	1022.3	1811.0	771.0				
	71	1702.5	1439.3	1697.2	1202.2	1696.8	945.2	1696.8	690.0		
	67	1647.6	1528.4	1593.1	1379.7	1592.8	1115.4	1592.8	866.2	1592.8	617.1
	62	1566.3	1548.8	1532.5	1480.0	1472.1	1341.6	1466.1	1088.5	1460.1	835.3
47000	75	1826.8	1316.4	1825.1	1049.6	1824.3	782.5				
	71	1720.0	1480.9	1710.2	1240.3	1709.4	966.6	1709.4	697.1		
	67	1662.3	1559.5	1609.9	1429.7	1609.3	1148.2	1609.3	885.0	1609.3	621.9
	62	1610.7	1596.8	1543.1	1501.4	1500.5	1391.0	1488.4	1121.9	1476.3	852.8
49500	75	1840.2	1359.2	1838.8	1076.9	1837.5	794.0				
	71	1737.4	1522.5	1723.2	1278.4	1722.0	987.9	1722.0	704.3		
	67	1677.0	1590.6	1626.7	1479.7	1625.8	1180.9	1625.8	903.9	1625.8	626.8
	62	1655.1	1644.7	1553.7	1522.7	1528.8	1440.3	1510.7	1155.3	1492.6	870.3
52000	75	1853.5	1402.1	1852.4	1104.3	1850.7	805.5				
	71	1754.8	1564.1	1736.2	1316.5	1734.7	1009.2	1734.7	711.4		
	67	1691.7	1621.6	1643.5	1529.7	1642.4	1213.7	1642.4	922.7	1642.4	631.7
	62	1699.5	1692.7	1564.4	1544.1	1557.1	1489.6	1533.0	1188.7	1508.8	887.8

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 7 – COOLING PERFORMANCE DATA* – 120 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 95.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	**75**	1638.0	1024.8	1636.5	852.0	1631.0	676.9				
	71	1531.5	1147.9	1530.8	976.6	1529.1	801.2	1529.1	620.1		
	67	1426.1	1267.7	1423.3	1096.8	1423.3	917.0	1423.3	740.4	1423.3	563.7
	62	1394.2	1371.1	1332.3	1262.8	1332.3	1081.5	1332.3	906.7	1332.3	731.8
34500	75	1659.1	1069.3	1657.3	880.8	1653.1	690.6				
	71	1552.2	1203.4	1550.6	1016.3	1549.4	824.7	1549.4	628.7		
	67	1461.8	1315.7	1443.7	1147.6	1443.6	950.9	1443.6	759.7	1443.6	568.4
	62	1433.4	1416.0	1364.8	1312.7	1344.1	1127.1	1344.1	936.6	1344.1	746.1
37000	**75**	1680.3	1113.8	1678.0	909.5	1675.3	704.3				
	71	1572.9	1259.0	1570.4	1056.0	1569.8	848.3	1569.8	637.3		
	67	1497.4	1363.7	1464.1	1198.5	1463.9	984.9	1463.9	779.0	1463.9	573.2
	62	1472.6	1461.0	1397.3	1362.5	1355.9	1172.7	1355.9	966.5	1355.9	760.3
39500	**75**	1701.5	1158.3	1698.8	938.3	1697.4	717.9				
	71	1593.6	1314.5	1590.2	1095.6	1590.1	871.8	1590.1	645.8		
	67	1533.1	1411.7	1484.5	1249.3	1484.2	1018.8	1484.2	798.3	1484.2	577.9
	62	1511.7	1505.9	1429.7	1412.4	1367.7	1218.2	1367.7	996.4	1367.7	774.6
42000	75	1722.6	1202.7	1719.5	967.0	1719.5	731.6				
	71	1614.3	1370.0	1610.0	1135.3	1610.4	895.3	1610.4	654.4		
	67	1568.8	1459.7	1504.9	1300.1	1504.5	1052.7	1504.5	817.7	1504.5	582.6
	62	1550.9	1550.9	1462.2	1462.2	1379.5	1263.8	1379.5	1026.3	1379.5	788.8
44500	**75**	1734.8	1245.5	1731.9	994.2	1731.6	743.0				
	71	1634.0	1399.1	1622.2	1173.4	1622.5	916.8	1622.5	661.7		
	67	1589.7	1500.3	1517.7	1348.8	1516.9	1084.1	1516.9	835.1	1516.9	586.1
	62	1569.5	1569.5	1461.7	1461.7	1421.8	1332.8	1410.8	1070.5	1399.7	808.3
47000	**75**	1746.9	1288.3	1744.2	1021.4	1743.7	754.4				
	71	1653.7	1428.2	1634.5	1211.6	1634.5	938.2	1634.5	668.9		
	67	1610.7	1541.0	1530.6	1397.5	1529.2	1115.4	1529.2	852.5	1529.2	589.5
	62	1588.1	1588.1	1461.3	1461.3	1464.1	1401.8	1442.0	1114.8	1419.9	827.7
49500	**75**	1759.0	1331.1	1756.6	1048.5	1755.8	765.8				
	71	1673.3	1457.3	1646.7	1249.7	1646.6	959.7	1646.6	676.2		
	67	1631.6	1581.6	1543.4	1446.1	1541.6	1146.8	1541.6	869.9	1541.6	593.0
	62	1606.7	1606.7	1460.8	1460.8	1506.4	1470.8	1473.3	1159.0	1440.1	847.2
52000	**75**	1771.1	1373.8	1768.9	1075.7	1767.9	777.2				
	71	1693.0	1486.4	1658.9	1287.8	1658.6	981.1	1658.6	683.4		
	67	1652.6	1622.3	1556.2	1494.8	1553.9	1178.1	1553.9	887.3	1553.9	596.4
	62	1625.4	1625.4	1460.3	1460.3	1548.7	1539.8	1504.5	1203.2	1460.3	866.6

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 7 – COOLING PERFORMANCE DATA* – 120 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 105.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1566.4	997.6	1565.7	825.2	1562.9	651.4				
	71	1458.7	1117.9	1456.5	946.1	1455.6	771.1	1455.6	590.2		
	67	1378.5	1229.5	1359.3	1068.5	1359.3	888.8	1359.3	712.3	1359.3	535.8
	62	1348.2	1325.4	1282.9	1214.4	1257.9	1045.7	1257.9	870.9	1257.9	696.2
34500	75	1583.1	1041.0	1582.6	853.1	1580.5	663.9				
	71	1478.3	1173.5	1476.2	986.3	1473.8	794.3	1473.8	598.5		
	67	1409.4	1276.3	1377.2	1118.7	1376.9	922.1	1376.9	731.0	1376.9	539.9
	62	1384.4	1364.2	1312.9	1252.3	1273.0	1093.1	1272.7	904.8	1272.3	716.5
37000	75	1599.9	1084.5	1599.5	881.1	1598.2	676.4				
	71	1497.9	1229.1	1495.9	1026.4	1491.9	817.6	1491.9	606.8		
	67	1440.4	1323.2	1395.0	1168.9	1394.6	955.4	1394.6	749.7	1394.6	543.9
	62	1420.5	1402.9	1342.9	1290.2	1288.2	1140.5	1287.4	938.6	1286.7	736.8
39500	75	1616.6	1127.9	1616.5	909.0	1615.8	688.9				
	71	1517.5	1284.7	1515.7	1066.6	1510.1	840.8	1510.1	615.0		
	67	1471.3	1370.1	1412.9	1219.1	1412.2	988.8	1412.2	768.4	1412.2	548.0
	62	1456.6	1441.7	1372.9	1328.1	1303.3	1187.9	1302.2	972.5	1301.0	757.1
42000	75	1633.4	1171.3	1633.4	936.9	1633.4	701.4				
	71	1537.1	1340.3	1535.4	1106.7	1528.2	864.0	1528.2	623.3		
	67	1502.2	1417.0	1430.7	1269.3	1429.8	1022.1	1429.8	787.1	1429.8	552.0
	62	1492.8	1480.5	1402.9	1366.0	1318.4	1235.3	1316.9	1006.4	1315.4	777.4
44500	75	1644.0	1213.9	1643.3	963.6	1643.2	712.4				
	71	1557.6	1366.3	1544.6	1144.1	1539.2	885.4	1539.2	630.5		
	67	1522.5	1453.2	1447.0	1313.5	1441.3	1053.5	1441.3	804.5	1441.3	555.5
	62	1512.1	1502.9	1411.7	1384.1	1347.8	1276.6	1341.1	1034.5	1334.5	792.3
47000	75	1654.6	1256.5	1653.2	990.2	1653.1	723.5				
	71	1578.1	1392.4	1553.8	1181.6	1550.1	906.9	1550.1	637.7		
	67	1542.9	1489.5	1463.4	1357.8	1452.8	1084.9	1452.8	821.9	1452.8	559.0
	62	1531.4	1525.2	1420.6	1402.1	1377.1	1318.0	1365.3	1062.6	1353.5	807.2
49500	75	1665.2	1299.1	1663.0	1016.9	1662.9	734.5				
	71	1598.6	1418.4	1563.0	1219.0	1561.1	928.3	1561.1	645.0		
	67	1563.2	1525.7	1479.7	1402.0	1464.3	1116.3	1464.3	839.4	1464.3	562.5
	62	1550.7	1547.6	1429.4	1420.2	1406.5	1359.3	1389.5	1090.7	1372.6	822.1
52000	75	1675.8	1341.7	1672.9	1043.6	1672.8	745.5				
	71	1619.1	1444.4	1572.2	1256.4	1572.1	949.8	1572.1	652.2		
	67	1583.6	1562.0	1496.1	1446.2	1475.8	1147.7	1475.8	856.8	1475.8	566.0
	62	1570.0	1570.0	1438.2	1438.2	1435.9	1400.7	1413.8	1118.9	1391.7	837.1

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 7 – COOLING PERFORMANCE DATA* – 120 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 115.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1494.8	970.4	1494.8	798.4	1494.8	625.8				
	71	1386.0	1087.8	1382.1	915.6	1382.1	741.0	1382.1	560.4		
	67	1331.0	1191.2	1295.3	1040.1	1295.3	860.5	1295.3	684.2	1295.3	507.9
	62	1302.2	1279.7	1233.4	1166.0	1183.5	1009.8	1183.5	835.2	1183.5	660.5
34500	75	1506.6	1012.7	1505.8	824.8	1504.4	636.1				
	71	1402.2	1138.6	1397.9	954.9	1397.9	763.9	1397.9	568.4		
	67	1356.6	1237.9	1310.8	1089.9	1310.8	893.5	1310.8	702.5	1310.8	511.6
	62	1334.4	1316.0	1260.6	1205.2	1200.2	1058.5	1200.2	868.3	1200.2	678.1
37000	75	1518.3	1054.9	1516.8	851.1	1514.1	646.3				
	71	1418.3	1189.4	1413.7	994.3	1413.7	786.8	1413.7	576.3		
	67	1382.2	1284.7	1326.3	1139.6	1326.3	926.4	1326.3	720.8	1326.3	515.3
	62	1366.7	1352.3	1287.7	1244.5	1216.9	1107.2	1216.9	901.5	1216.9	695.8
39500	75	1530.1	1097.2	1527.8	877.5	1523.7	656.6				
	71	1434.5	1240.2	1429.5	1033.6	1429.5	809.7	1429.5	584.3		
	67	1407.8	1331.4	1341.7	1189.4	1341.7	959.4	1341.7	739.1	1341.7	518.9
	62	1398.9	1388.5	1314.9	1283.7	1233.6	1155.9	1233.6	934.6	1233.6	713.4
42000	75	1541.8	1139.4	1538.8	903.8	1533.3	666.8				
	71	1450.7	1291.0	1445.3	1072.9	1445.3	832.6	1445.3	592.2		
	67	1433.5	1378.2	1357.2	1239.1	1357.2	992.3	1357.2	757.5	1357.2	522.6
	62	1431.1	1424.8	1342.0	1322.9	1250.3	1204.6	1250.3	967.8	1250.3	731.0
44500	75	1551.5	1181.9	1548.3	930.7	1544.4	678.6				
	71	1474.3	1318.8	1455.4	1110.9	1455.4	854.1	1455.4	599.4		
	67	1453.7	1409.1	1376.9	1278.7	1367.3	1023.5	1367.3	774.7	1367.3	525.9
	62	1452.0	1447.2	1360.5	1346.2	1268.5	1218.8	1268.5	984.5	1268.5	750.1
47000	75	1561.1	1224.5	1557.9	957.6	1555.5	690.3				
	71	1498.0	1346.7	1465.4	1149.0	1465.4	875.5	1465.4	606.6		
	67	1474.0	1440.0	1396.6	1318.4	1377.4	1054.8	1377.4	791.9	1377.4	529.1
	62	1472.9	1469.7	1379.1	1369.5	1286.7	1233.1	1286.7	1001.2	1286.7	769.3
49500	75	1570.8	1267.0	1567.4	984.5	1566.5	702.1				
	71	1521.6	1374.5	1475.5	1187.0	1475.5	897.0	1475.5	613.8		
	67	1494.2	1470.8	1416.2	1358.0	1387.5	1086.0	1387.5	809.2	1387.5	532.4
	62	1493.8	1492.2	1397.6	1392.8	1304.8	1247.3	1304.8	1017.8	1304.8	788.4
52000	75	1580.4	1309.5	1576.9	1011.4	1577.6	713.8				
	71	1545.2	1402.4	1485.5	1225.0	1485.5	918.4	1485.5	620.9		
	67	1514.5	1501.7	1435.9	1397.6	1397.6	1117.2	1397.6	826.4	1397.6	535.6
	62	1514.6	1514.6	1416.1	1416.1	1323.0	1261.5	1323.0	1034.5	1323.0	807.5

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 8 - COOLING PERFORMANCE DATA* – 130 TON MODEL

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 75.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1977.8	1208.4	1977.9	1009.4	1967.6	809.2				
	71	1850.5	1346.7	1851.3	1149.0	1842.1	947.3	1835.9	746.4		
	67	1731.2	1483.3	1731.7	1286.5	1731.0	1082.6	1726.7	887.3	1722.4	692.0
	62	1657.6	1594.5	1592.0	1456.4	1587.7	1247.8	1589.1	1056.8	1590.5	865.7
34500	75	2005.0	1253.3	2004.1	1038.4	1995.8	823.8				
	71	1875.9	1401.6	1876.5	1188.5	1867.1	970.1	1860.9	755.3		
	67	1760.5	1526.4	1756.0	1335.2	1754.7	1115.2	1750.3	906.0	1745.9	696.8
	62	1694.2	1639.2	1621.6	1496.9	1616.3	1297.4	1616.3	1090.8	1616.2	884.2
37000	75	2032.2	1298.1	2030.4	1067.4	2024.0	838.4				
	71	1901.3	1456.5	1901.7	1228.0	1892.2	993.0	1885.9	764.3		
	67	1789.7	1569.5	1780.3	1383.8	1778.3	1147.7	1773.9	924.7	1769.5	701.7
	62	1730.7	1683.8	1651.3	1537.4	1644.9	1347.1	1643.4	1124.9	1642.0	902.7
39500	75	2059.4	1343.0	2056.6	1096.4	2052.2	852.9				
	71	1926.8	1511.5	1926.9	1267.5	1917.2	1015.8	1910.9	773.3		
	67	1819.0	1612.7	1804.6	1432.4	1802.0	1180.3	1797.5	943.4	1793.0	706.5
	62	1767.3	1728.5	1680.9	1577.9	1673.4	1396.7	1670.6	1159.0	1667.8	921.3
42000	75	2086.7	1387.9	2082.8	1125.4	2080.4	867.5				
	71	1952.2	1566.4	1952.1	1307.0	1942.3	1038.6	1935.8	782.2		
	67	1848.3	1655.8	1828.9	1481.0	1825.7	1212.8	1821.1	962.1	1816.5	711.4
	62	1803.8	1773.1	1710.6	1618.4	1702.0	1446.3	1697.8	1193.0	1693.5	939.8
44500	75	2104.2	1430.8	2099.6	1152.6	2100.6	880.7				
	71	1969.9	1619.9	1969.5	1345.0	1962.2	1062.0	1957.3	792.1		
	67	1878.3	1702.7	1845.7	1529.1	1842.2	1243.4	1835.6	978.6	1828.9	713.8
	62	1838.0	1809.8	1742.1	1657.4	1713.6	1489.6	1709.1	1221.3	1704.6	953.0
47000	75	2121.8	1473.8	2116.5	1179.8	2120.7	894.0				
	71	1987.6	1673.3	1986.9	1383.0	1982.0	1085.4	1978.8	802.1		
	67	1908.4	1749.7	1862.6	1577.1	1858.8	1274.1	1850.1	995.1	1841.3	716.2
	62	1872.2	1846.4	1773.6	1696.4	1725.2	1532.9	1720.4	1249.5	1715.7	966.1
49500	75	2139.4	1516.8	2133.4	1207.0	2140.8	907.3				
	71	2005.4	1726.8	2004.3	1421.0	2001.9	1108.9	2000.3	812.0		
	67	1938.5	1796.6	1879.4	1625.2	1875.3	1304.7	1864.5	1011.7	1853.7	718.6
	62	1906.4	1883.1	1805.1	1735.4	1736.8	1576.2	1731.8	1277.8	1726.7	979.3
52000	75	2156.9	1559.8	2150.2	1234.2	2161.0	920.5				
	71	2023.1	1780.3	2021.8	1459.1	2021.8	1132.3	2021.8	821.9		
	67	1968.6	1843.5	1896.2	1673.3	1891.9	1335.4	1879.0	1028.2	1866.1	721.0
	62	1940.5	1919.8	1836.6	1774.4	1748.4	1619.5	1743.1	1306.0	1737.8	992.5

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 8 – COOLING PERFORMANCE DATA* – 130 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 85.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	**75**	1905.1	1180.1	1902.7	980.0	1894.0	780.8				
	71	1780.5	1317.1	1779.5	1118.9	1775.1	919.1	1770.9	719.0		
	67	1663.2	1452.1	1665.0	1256.1	1664.6	1052.4	1661.7	857.7	1658.7	663.0
	62	1601.2	1550.3	1530.8	1408.8	1527.7	1218.0	1528.0	1026.4	1528.3	834.9
34500	**75**	1930.8	1224.8	1928.0	1009.2	1920.2	795.0				
	71	1805.0	1372.1	1803.6	1158.3	1799.9	942.3	1796.1	728.5		
	67	1694.2	1493.7	1689.6	1305.3	1688.2	1085.3	1685.5	876.9	1682.9	668.5
	62	1639.8	1594.6	1566.9	1454.4	1550.7	1265.4	1550.2	1058.5	1549.6	851.6
37000	**75**	1956.5	1269.5	1953.2	1038.3	1946.3	809.3				
	71	1829.5	1427.1	1827.8	1197.7	1824.7	965.5	1821.4	738.1		
	67	1725.2	1535.3	1714.2	1354.5	1711.8	1118.2	1709.4	896.1	1707.1	674.0
	62	1678.3	1638.8	1603.0	1500.1	1573.7	1312.9	1572.3	1090.6	1570.9	868.4
39500	**75**	1982.2	1314.2	1978.4	1067.4	1972.4	823.5				
	71	1854.0	1482.1	1851.9	1237.2	1849.6	988.7	1846.6	747.6		
	67	1756.2	1576.9	1738.8	1403.7	1735.3	1151.1	1733.3	915.3	1731.2	679.6
	62	1716.8	1683.1	1639.1	1545.8	1596.7	1360.3	1594.4	1122.7	1592.2	885.2
42000	**75**	2007.8	1358.9	2003.7	1096.5	1998.6	837.7				
	71	1878.6	1537.1	1876.0	1276.6	1874.4	1012.0	1871.9	757.1		
	67	1787.3	1618.5	1763.4	1452.9	1758.9	1184.0	1757.2	934.6	1755.4	685.1
	62	1755.3	1727.4	1675.2	1591.4	1619.6	1407.7	1616.6	1154.9	1613.5	902.0
44500	75	2022.5	1401.3	2018.0	1123.3	2015.3	850.2				
	71	1893.8	1588.3	1891.2	1314.2	1889.3	1033.8	1886.7	764.9		
	67	1814.6	1667.0	1777.0	1500.1	1772.4	1213.9	1769.3	950.6	1766.1	687.2
	62	1785.8	1760.8	1699.5	1624.4	1633.1	1452.3	1629.5	1184.3	1625.9	916.3
47000	**75**	2037.1	1443.6	2032.3	1150.1	2032.0	862.7				
	71	1908.9	1639.4	1906.4	1351.8	1904.3	1055.7	1901.5	772.6		
	67	1841.9	1715.5	1790.5	1547.2	1785.9	1243.9	1781.4	966.6	1776.9	689.4
	62	1816.4	1794.3	1723.7	1657.5	1646.6	1496.9	1642.4	1213.7	1638.3	930.6
49500	**75**	2051.8	1486.0	2046.6	1176.8	2048.6	875.1				
	71	1924.1	1690.6	1921.6	1389.3	1919.3	1077.6	1916.3	780.3		
	67	1869.3	1764.1	1804.0	1594.4	1799.5	1273.8	1793.5	982.6	1787.6	691.5
	62	1846.9	1827.8	1747.9	1690.5	1660.0	1541.4	1655.3	1243.1	1650.6	944.8
52000	**75**	2066.4	1528.4	2061.0	1203.6	2065.3	887.6				
	71	1939.3	1741.7	1936.8	1426.9	1934.2	1099.5	1931.1	788.1		
	67	1896.6	1812.6	1817.5	1641.5	1813.0	1303.7	1805.7	998.6	1798.4	693.6
	62	1877.4	1861.2	1772.1	1723.5	1673.5	1586.0	1668.3	1272.6	1663.0	959.1

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 8 – COOLING PERFORMANCE DATA* – 130 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 95.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	**75**	1832.5	1151.8	1827.6	950.6	1820.5	752.3				
	71	1710.4	1287.4	1707.7	1088.7	1708.1	890.9	1705.8	691.6		
	67	1595.2	1420.9	1598.3	1225.6	1598.2	1022.1	1596.6	828.0	1595.0	634.0
	62	1544.9	1506.1	1469.7	1361.2	1467.8	1188.2	1466.9	996.1	1466.1	804.0
34500	**75**	1854.4	1195.7	1849.7	979.1	1843.1	765.9				
	71	1731.6	1341.7	1729.4	1127.8	1729.4	913.2	1727.4	700.2		
	67	1629.8	1443.8	1619.9	1216.4	1619.0	1054.4	1617.4	846.5	1615.8	638.6
	62	1583.8	1549.1	1505.0	1406.8	1502.7	1241.7	1501.7	1034.6	1500.7	827.5
37000	**75**	1876.4	1239.7	1871.8	1007.6	1865.7	779.5				
	71	1752.9	1395.9	1751.0	1166.8	1750.6	935.5	1748.9	708.8		
	67	1664.4	1466.8	1641.5	1207.2	1639.8	1086.7	1638.2	865.0	1636.5	643.3
	62	1622.8	1592.1	1540.3	1452.3	1537.7	1295.1	1536.5	1073.0	1535.3	851.0
39500	75	1898.3	1283.6	1893.9	1036.1	1888.3	793.0				
	71	1774.1	1450.1	1772.7	1205.9	1771.9	957.8	1770.4	717.4		
	67	1699.0	1489.8	1663.1	1198.0	1660.6	1119.0	1658.9	883.5	1657.2	648.0
	62	1661.7	1635.2	1575.6	1497.9	1572.7	1348.6	1571.3	1111.5	1569.8	874.4
42000	**75**	1920.2	1327.5	1916.0	1064.7	1910.9	806.6				
	71	1795.3	1504.4	1794.3	1244.9	1793.1	980.1	1791.9	725.9		
	67	1733.6	1512.7	1684.7	1188.8	1681.3	1151.3	1679.7	902.0	1678.0	652.6
	62	1700.7	1678.2	1610.9	1543.5	1607.6	1402.1	1606.0	1150.0	1604.4	897.9
44500	**75**	1934.2	1369.9	1929.9	1091.7	1925.6	818.6				
	71	1810.4	1554.1	1808.7	1282.4	1806.5	1001.7	1804.1	733.0		
	67	1756.4	1580.0	1698.2	1294.0	1694.5	1181.5	1692.8	918.8	1691.1	656.0
	62	1729.1	1709.3	1635.0	1575.8	1605.4	1439.7	1602.9	1172.3	1600.4	904.9
47000	75	1948.1	1412.3	1943.8	1118.8	1940.3	830.6				
	71	1825.4	1603.8	1823.0	1319.8	1819.9	1023.4	1816.2	740.1		
	67	1779.1	1647.2	1711.7	1399.3	1707.7	1211.6	1706.0	935.5	1704.3	659.4
	62	1757.5	1740.4	1659.2	1608.0	1603.1	1477.3	1599.7	1194.6	1596.3	911.8
49500	**75**	1962.0	1454.7	1957.8	1145.9	1955.0	842.7				
	71	1840.5	1653.5	1837.4	1357.3	1833.3	1045.0	1828.3	747.2		
	67	1801.9	1714.4	1725.3	1504.5	1720.9	1241.8	1719.2	952.3	1717.5	662.8
	62	1785.9	1771.5	1683.3	1640.3	1600.8	1514.9	1596.6	1216.8	1592.3	918.8
52000	**75**	1976.0	1497.1	1971.7	1173.0	1969.7	854.7				
	71	1855.5	1703.2	1851.7	1394.8	1846.6	1066.6	1840.5	754.2		
	67	1824.7	1781.7	1738.8	1609.8	1734.1	1272.0	1732.4	969.1	1730.6	666.2
	62	1814.3	1802.7	1707.5	1672.6	1598.6	1552.5	1593.4	1239.1	1588.2	925.7

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 8 – COOLING PERFORMANCE DATA* – 130 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 105.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1744.6	1118.6	1743.0	918.9	1735.1	720.3				
	71	1631.7	1255.2	1628.8	1056.5	1629.7	858.9	1627.5	659.8		
	67	1530.6	1392.3	1524.5	1193.1	1523.4	989.0	1521.9	795.1	1520.4	601.2
	62	1488.4	1456.1	1417.7	1324.8	1399.8	1155.2	1398.9	963.1	1398.0	771.0
34500	75	1765.1	1162.5	1762.1	946.8	1755.4	733.4				
	71	1651.8	1309.5	1649.1	1095.4	1649.4	881.1	1646.4	667.8		
	67	1562.8	1430.2	1543.8	1241.1	1542.1	1020.9	1540.5	813.2	1539.0	605.4
	62	1525.3	1496.7	1450.2	1367.3	1436.0	1209.7	1434.9	1002.6	1433.8	795.5
37000	75	1785.5	1206.3	1781.2	974.7	1775.6	746.6				
	71	1672.0	1363.9	1669.4	1134.4	1669.2	903.3	1665.3	675.8		
	67	1595.0	1468.1	1563.1	1289.2	1560.7	1052.9	1559.2	831.2	1557.6	609.6
	62	1562.3	1537.4	1482.6	1409.8	1472.1	1264.1	1470.9	1042.0	1469.6	819.9
39500	75	1805.9	1250.1	1800.4	1002.6	1795.9	759.8				
	71	1692.1	1418.2	1689.7	1173.4	1688.9	925.6	1684.1	683.9		
	67	1627.2	1506.0	1582.3	1337.3	1579.4	1084.8	1577.8	849.3	1576.2	613.8
	62	1599.3	1578.1	1515.1	1452.2	1508.3	1318.5	1506.9	1081.4	1505.5	844.3
42000	75	1826.3	1293.9	1819.5	1030.5	1816.2	772.9				
	71	1712.3	1472.5	1710.0	1212.3	1708.7	947.8	1703.0	691.9		
	67	1659.4	1544.0	1601.6	1385.3	1598.0	1116.7	1596.4	867.4	1594.8	618.0
	62	1636.3	1618.7	1547.5	1494.7	1544.4	1373.0	1542.9	1120.9	1541.3	868.8
44500	75	1841.9	1337.3	1830.8	1057.1	1829.3	784.8				
	71	1733.2	1520.4	1721.4	1249.1	1719.2	968.7	1713.9	698.9		
	67	1687.0	1594.4	1612.3	1432.1	1608.3	1146.1	1606.8	883.4	1605.3	620.8
	62	1668.9	1654.2	1569.2	1525.2	1540.9	1406.6	1538.9	1141.3	1537.0	876.0
47000	75	1857.6	1380.7	1842.2	1083.7	1842.3	796.6				
	71	1754.1	1568.2	1732.7	1286.0	1729.7	989.6	1724.8	705.9		
	67	1714.6	1644.9	1623.1	1478.8	1618.6	1175.5	1617.2	899.5	1615.8	623.6
	62	1701.4	1689.7	1590.9	1555.8	1537.5	1440.2	1535.0	1161.7	1532.6	883.3
49500	75	1873.3	1424.1	1853.6	1110.3	1855.3	808.5				
	71	1775.0	1616.1	1744.1	1322.8	1740.2	1010.6	1735.7	712.9		
	67	1742.2	1695.3	1633.8	1525.6	1628.9	1204.9	1627.5	915.6	1626.2	626.3
	62	1733.9	1725.2	1612.6	1586.3	1534.0	1473.9	1531.1	1182.2	1528.2	890.5
52000	75	1889.0	1467.5	1865.0	1136.9	1868.4	820.4				
	71	1795.9	1664.0	1755.4	1359.6	1750.7	1031.5	1746.6	719.9		
	67	1769.8	1745.8	1644.5	1572.3	1639.1	1234.2	1637.9	931.7	1636.7	629.1
	62	1766.5	1760.6	1634.2	1616.8	1530.5	1507.5	1527.2	1202.6	1523.9	897.7

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 8 – COOLING PERFORMANCE DATA* – 130 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 115.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1656.8	1085.5	1658.4	887.2	1649.7	688.2				
	71	1552.9	1223.0	1549.9	1024.2	1551.3	826.8	1549.2	627.9		
	67	1466.0	1363.6	1450.7	1160.6	1448.6	955.9	1447.2	762.2	1445.7	568.5
	62	1431.8	1406.0	1365.8	1288.4	1331.9	1122.2	1330.9	930.1	1329.8	738.0
34500	75	1672.4	1128.2	1673.3	914.1	1666.8	700.7				
	71	1569.8	1276.7	1568.5	1063.1	1568.8	848.7	1565.9	635.6		
	67	1496.1	1397.7	1467.7	1208.2	1465.3	987.6	1463.8	780.0	1462.4	572.5
	62	1466.3	1443.8	1394.2	1326.7	1368.0	1177.1	1366.9	970.0	1365.7	762.9
37000	75	1687.9	1170.8	1688.2	941.1	1683.9	713.3				
	71	1586.7	1330.4	1587.2	1102.0	1586.3	870.5	1582.6	643.4		
	67	1526.2	1431.7	1484.6	1255.9	1482.0	1019.2	1480.5	797.8	1479.1	576.4
	62	1500.7	1481.5	1422.5	1365.0	1404.1	1232.0	1402.9	1009.9	1401.6	787.8
39500	75	1703.4	1213.5	1703.1	968.0	1701.0	725.9				
	71	1603.7	1384.1	1605.9	1141.0	1603.9	892.4	1599.3	651.1		
	67	1556.3	1465.8	1501.6	1303.5	1498.7	1050.9	1497.2	815.7	1495.7	580.4
	62	1535.1	1519.2	1450.9	1403.3	1440.2	1286.9	1438.9	1049.8	1437.5	812.7
42000	75	1718.9	1256.1	1718.0	994.9	1718.2	738.5				
	71	1620.6	1437.8	1624.5	1179.9	1621.4	914.3	1616.0	658.8		
	67	1586.4	1499.8	1518.5	1351.1	1515.4	1082.6	1513.9	833.5	1512.4	584.4
	62	1569.5	1557.0	1479.3	1441.6	1476.3	1341.7	1474.9	1089.7	1473.4	837.6
44500	75	1739.7	1301.6	1728.0	1021.4	1730.4	750.4				
	71	1649.5	1484.5	1633.2	1216.0	1629.7	934.8	1625.1	665.5		
	67	1618.6	1552.3	1526.4	1397.1	1522.6	1111.1	1521.3	848.7	1520.0	586.3
	62	1606.8	1597.4	1499.7	1471.4	1472.9	1371.9	1471.4	1108.8	1469.9	845.7
47000	75	1760.5	1347.1	1738.1	1047.8	1742.6	762.3				
	71	1678.4	1531.3	1641.8	1252.1	1638.1	955.3	1634.3	672.2		
	67	1650.7	1604.8	1534.4	1443.0	1529.8	1139.6	1528.7	863.9	1527.6	588.2
	62	1644.1	1637.8	1520.1	1501.3	1469.4	1402.1	1467.9	1127.9	1466.5	853.7
49500	75	1781.2	1392.5	1748.2	1074.3	1754.8	774.1				
	71	1707.4	1578.0	1650.4	1288.3	1646.5	975.8	1643.5	678.8		
	67	1682.9	1657.4	1542.3	1488.9	1537.0	1168.0	1536.1	879.1	1535.2	590.1
	62	1681.3	1678.2	1540.6	1531.1	1466.0	1432.3	1464.5	1147.0	1463.0	861.7
52000	75	1802.0	1438.0	1758.2	1100.8	1767.1	786.0				
	71	1736.3	1624.7	1659.1	1324.4	1654.8	996.3	1652.6	685.5		
	67	1715.0	1709.9	1550.3	1534.8	1544.2	1196.5	1543.5	894.2	1542.8	592.0
	62	1718.6	1718.6	1561.0	1561.0	1462.5	1462.5	1461.0	1166.1	1459.6	869.7

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 9 - COOLING PERFORMANCE DATA* – 150 TON MODEL

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 75.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	2138.8	1312.9	2142.3	1080.7	2140.0	885.8				
	71	2001.9	1468.6	2003.0	1237.7	1999.2	1033.3	2000.4	814.4		
	67	1873.3	1630.0	1871.6	1406.0	1868.1	1184.3	1869.1	966.7	1870.0	749.0
	62	1799.6	1746.3	1719.5	1595.0	1717.2	1369.3	1717.9	1160.6	1718.6	951.9
34500	75	2158.9	1349.3	2161.2	1105.0	2159.5	892.6				
	71	2021.5	1512.6	2023.0	1267.8	2018.7	1048.5	2019.9	819.8		
	67	1892.6	1659.2	1891.0	1446.3	1886.7	1207.0	1887.2	980.1	1887.8	753.3
	62	1826.8	1778.7	1737.9	1620.2	1736.7	1403.3	1736.5	1183.5	1736.3	963.7
37000	75	2179.0	1385.8	2180.1	1129.4	2179.0	899.4				
	71	2041.1	1556.6	2043.0	1297.9	2038.2	1063.8	2039.4	825.3		
	67	1912.0	1688.5	1910.3	1486.5	1905.4	1229.7	1905.4	993.6	1905.5	757.5
	62	1853.9	1811.1	1756.2	1645.4	1756.2	1437.3	1755.1	1206.4	1754.1	975.4
39500	75	2199.0	1422.2	2199.0	1153.7	2198.4	906.2				
	71	2060.6	1600.6	2062.9	1327.9	2057.6	1079.0	2058.9	830.7		
	67	1931.3	1717.7	1929.7	1526.8	1924.0	1252.4	1923.6	1007.1	1923.3	761.8
	62	1881.1	1843.4	1774.6	1670.5	1775.7	1471.3	1773.7	1229.2	1771.8	987.2
42000	75	2219.1	1458.7	2217.9	1178.0	2217.9	913.0				
	71	2080.2	1644.7	2082.9	1358.0	2077.1	1094.2	2078.4	836.1		
	67	1950.7	1746.9	1949.0	1567.0	1942.6	1275.1	1941.8	1020.6	1941.0	766.0
	62	1908.2	1875.8	1792.9	1695.7	1795.2	1505.3	1792.4	1252.1	1789.5	998.9
44500	75	2235.3	1490.0	2233.7	1197.0	2232.7	923.0				
	71	2095.3	1686.4	2096.1	1391.8	2091.7	1113.7	2092.9	877.0		
	67	1980.8	1787.9	1962.7	1602.0	1957.4	1301.8	1956.8	1035.3	1956.3	768.8
	62	1939.8	1909.2	1827.1	1735.3	1809.0	1535.6	1805.6	1273.7	1802.2	1011.8
47000	75	2251.4	1521.3	2249.5	1216.0	2247.4	933.0				
	71	2110.4	1728.1	2109.4	1425.5	2106.3	1133.1	2107.4	918.0		
	67	2011.0	1828.8	1976.4	1636.9	1972.2	1328.6	1971.8	1050.1	1971.5	771.6
	62	1971.4	1942.6	1861.2	1774.8	1822.8	1565.8	1818.9	1295.2	1814.9	1024.6
49500	75	2267.6	1552.7	2265.2	1235.0	2262.2	943.0				
	71	2125.4	1769.8	2122.6	1459.3	2120.8	1152.6	2121.9	958.9		
	67	2041.1	1869.8	1990.0	1671.9	1986.9	1355.3	1986.8	1064.8	1986.8	774.4
	62	2002.9	1975.9	1895.4	1814.4	1836.6	1596.1	1832.1	1316.8	1827.6	1037.5
52000	75	2283.7	1584.0	2281.0	1254.0	2276.9	953.0				
	71	2140.5	1811.5	2135.8	1493.0	2135.4	1172.0	2136.5	999.9		
	67	2071.3	1910.7	2003.7	1706.8	2001.7	1382.0	2001.9	1079.6	2002.0	777.2
	62	2034.5	2009.3	1929.5	1853.9	1850.4	1626.3	1845.4	1338.3	1840.3	1050.3

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 9 – COOLING PERFORMANCE DATA* – 150 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 85.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	2052.4	1279.8	2053.3	1046.3	2050.4	832.4				
	71	1920.5	1442.5	1920.4	1214.4	1919.3	997.9	1918.7	780.3		
	67	1795.7	1596.2	1795.6	1364.6	1791.8	1148.0	1792.7	931.8	1793.5	715.5
	62	1736.4	1693.6	1650.3	1539.6	1648.1	1335.7	1648.6	1126.2	1649.1	916.8
34500	75	2072.5	1313.2	2073.1	1068.9	2070.2	846.1				
	71	1940.0	1486.8	1939.3	1246.0	1938.8	1019.4	1938.5	788.9		
	67	1825.2	1641.6	1813.8	1406.2	1810.0	1172.5	1811.1	945.8	1812.1	719.1
	62	1767.6	1733.3	1682.1	1592.7	1666.0	1374.3	1665.7	1151.4	1665.4	928.5
37000	75	2092.7	1346.7	2093.0	1091.6	2090.0	859.8				
	71	1959.6	1531.1	1958.2	1277.7	1958.4	1041.0	1958.3	797.5		
	67	1854.6	1686.9	1832.0	1447.8	1828.3	1197.0	1829.5	959.9	1830.8	722.8
	62	1798.7	1773.0	1714.0	1645.8	1683.8	1412.9	1682.8	1176.5	1681.8	940.2
39500	75	2112.8	1380.2	2112.8	1114.3	2109.7	873.4				
	71	1979.1	1575.4	1977.0	1309.3	1978.0	1062.5	1978.1	806.1		
	67	1884.1	1732.3	1850.2	1489.4	1846.5	1221.4	1847.9	973.9	1849.4	726.4
	62	1829.8	1812.7	1745.8	1698.9	1701.7	1451.4	1699.9	1201.7	1698.2	951.9
42000	75	2132.9	1413.7	2132.6	1137.0	2129.5	887.1				
	71	1998.6	1619.7	1995.9	1341.0	1997.6	1084.0	1997.9	814.7		
	67	1913.6	1777.7	1868.4	1531.0	1864.7	1245.9	1866.4	988.0	1868.0	730.0
	62	1861.0	1852.4	1777.7	1752.0	1719.5	1490.0	1717.1	1226.8	1714.6	963.6
44500	75	2145.4	1447.7	2144.5	1158.1	2141.6	892.8				
	71	2010.7	1649.4	2007.5	1370.3	2008.6	1098.6	2008.9	835.9		
	67	1933.5	1799.2	1881.0	1568.2	1877.2	1271.9	1878.4	1002.5	1879.5	733.2
	62	1887.1	1875.7	1798.0	1763.9	1731.7	1519.8	1728.8	1248.1	1725.9	976.4
47000	75	2157.9	1481.6	2156.4	1179.3	2153.7	898.6				
	71	2022.9	1679.2	2019.1	1399.5	2019.5	1113.3	2020.0	857.1		
	67	1953.4	1820.6	1893.6	1605.5	1889.7	1298.0	1890.4	1017.1	1891.0	736.3
	62	1913.2	1899.0	1818.3	1775.7	1743.9	1549.6	1740.5	1269.4	1737.1	989.2
49500	75	2170.3	1515.6	2168.2	1200.4	2165.8	904.3				
	71	2035.0	1708.9	2030.7	1428.8	2030.5	1127.9	2031.1	878.2		
	67	1973.3	1842.1	1906.2	1642.7	1902.2	1324.0	1902.4	1031.7	1902.5	739.5
	62	1939.4	1922.4	1838.6	1787.6	1756.0	1579.4	1752.2	1290.7	1748.4	1002.0
52000	75	2182.8	1549.6	2180.1	1221.5	2177.9	910.1				
	71	2047.2	1738.7	2042.4	1458.0	2041.4	1142.5	2042.1	899.4		
	67	1993.3	1863.6	1918.8	1679.9	1914.8	1350.0	1914.4	1046.3	1914.0	742.6
	62	1965.5	1945.7	1858.9	1799.4	1768.2	1609.2	1763.9	1312.0	1759.6	1014.9

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 9 – COOLING PERFORMANCE DATA* – 150 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 95.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1965.9	1246.6	1964.3	1011.8	1960.8	779.0				
	71	1839.2	1416.3	1837.8	1191.0	1839.3	962.5	1837.0	746.2		
	67	1718.1	1562.4	1719.5	1323.2	1715.5	1111.7	1716.3	896.9	1717.0	682.0
	62	1673.2	1640.9	1581.0	1484.2	1579.0	1302.1	1579.3	1091.9	1579.5	881.6
34500	75	1982.7	1281.9	1981.2	1034.1	1978.6	793.3				
	71	1856.1	1457.0	1854.1	1218.5	1854.4	987.4	1852.9	755.6		
	67	1747.4	1596.5	1734.9	1365.9	1731.4	1135.7	1731.8	910.9	1732.3	686.0
	62	1705.7	1669.4	1612.6	1521.1	1594.9	1340.1	1594.3	1118.4	1593.7	896.7
37000	75	1999.4	1317.1	1998.1	1056.4	1996.3	807.6				
	71	1873.1	1497.7	1870.4	1246.0	1869.6	1012.3	1868.8	765.1		
	67	1776.8	1630.5	1750.2	1408.6	1747.2	1159.8	1747.4	924.9	1747.5	690.0
	62	1738.3	1697.9	1644.2	1557.9	1610.8	1378.1	1609.3	1144.9	1607.9	911.8
39500	75	2016.2	1352.4	2015.0	1078.7	2014.1	821.8				
	71	1890.0	1538.3	1886.6	1273.5	1884.7	1037.1	1884.7	774.5		
	67	1806.1	1664.6	1765.6	1451.3	1763.1	1183.8	1762.9	938.9	1762.8	694.0
	62	1770.8	1726.3	1675.7	1594.8	1626.6	1416.0	1624.3	1171.5	1622.0	926.9
42000	75	2033.0	1387.7	2031.9	1101.0	2031.8	836.1				
	71	1907.0	1579.0	1902.9	1301.0	1899.8	1062.0	1900.6	784.0		
	67	1835.4	1698.7	1780.9	1494.0	1778.9	1207.8	1778.5	952.9	1778.0	698.0
	62	1803.3	1754.8	1707.3	1631.6	1642.5	1454.0	1639.4	1198.0	1636.2	942.0
44500	75	2045.2	1419.6	2043.7	1123.0	2043.6	843.9				
	71	1918.7	1600.7	1914.4	1331.5	1911.7	1074.8	1912.4	787.8		
	67	1855.4	1728.1	1794.1	1533.8	1791.1	1235.4	1790.6	967.9	1790.0	700.5
	62	1826.6	1786.6	1727.5	1659.9	1653.4	1488.5	1650.1	1219.9	1646.9	951.4
47000	75	2057.4	1451.4	2055.6	1145.0	2055.3	851.6				
	71	1930.4	1622.5	1925.9	1362.0	1923.6	1087.5	1924.2	791.5		
	67	1875.3	1757.6	1807.4	1573.5	1803.4	1262.9	1802.7	983.0	1802.0	703.0
	62	1849.9	1818.4	1747.8	1688.3	1664.3	1523.0	1660.9	1241.9	1657.6	960.7
49500	75	2069.6	1483.3	2067.4	1167.0	2067.1	859.4				
	71	1942.1	1644.2	1937.4	1392.5	1935.5	1100.3	1936.0	795.3		
	67	1895.3	1787.0	1820.6	1613.3	1815.6	1290.5	1814.8	998.0	1814.0	705.5
	62	1873.2	1850.2	1768.0	1716.6	1675.1	1557.5	1671.7	1263.8	1668.2	970.1
52000	75	2081.8	1515.2	2079.2	1189.0	2078.8	867.1				
	71	1953.8	1665.9	1948.9	1423.0	1947.4	1113.0	1947.8	799.0		
	67	1915.2	1816.5	1833.8	1653.0	1827.8	1318.0	1826.9	1013.0	1826.0	708.0
	62	1896.5	1882.0	1788.2	1744.9	1686.0	1592.0	1682.5	1285.7	1678.9	979.4

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Cooling Performance Data (Cont'd)

TABLE 9 – COOLING PERFORMANCE DATA* – 150 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 105.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1868.0	1206.8	1868.7	974.5	1865.6	760.5				
	71	1752.2	1375.5	1748.4	1142.5	1742.5	918.9	1741.1	705.6		
	67	1656.4	1498.3	1639.3	1287.1	1634.5	1076.7	1636.3	862.4	1638.0	648.0
	62	1616.4	1588.0	1531.2	1446.0	1506.4	1266.5	1504.8	1056.0	1503.2	845.5
34500	75	1883.2	1240.3	1882.6	996.9	1880.8	770.2				
	71	1767.8	1415.5	1763.8	1169.6	1759.4	935.1	1758.4	712.4		
	67	1681.7	1532.1	1654.6	1331.5	1649.1	1100.5	1650.3	875.4	1651.5	650.3
	62	1646.2	1624.0	1558.8	1492.0	1520.8	1305.6	1518.7	1076.6	1516.7	847.6
37000	75	1898.3	1273.8	1896.6	1019.3	1896.1	779.9				
	71	1783.3	1455.6	1779.2	1196.8	1776.4	951.3	1775.6	719.1		
	67	1707.0	1565.9	1669.8	1376.0	1663.6	1124.3	1664.3	888.4	1665.0	652.5
	62	1676.0	1659.9	1586.5	1538.0	1535.2	1344.7	1532.7	1097.2	1530.3	849.8
39500	75	1913.5	1307.2	1910.5	1041.6	1911.3	789.6				
	71	1798.9	1495.6	1794.6	1223.9	1793.3	967.5	1792.9	725.8		
	67	1732.3	1599.7	1685.1	1420.5	1678.2	1148.1	1678.3	901.4	1678.5	654.8
	62	1705.9	1695.8	1614.1	1584.0	1549.5	1383.9	1546.7	1117.9	1543.8	851.9
42000	75	1928.6	1340.7	1924.5	1064.0	1926.6	799.3				
	71	1814.5	1535.7	1810.0	1251.0	1810.3	983.7	1810.1	732.6		
	67	1757.6	1633.5	1700.3	1465.0	1692.7	1171.9	1692.4	914.5	1692.0	657.0
	62	1735.7	1731.7	1641.8	1630.0	1563.9	1423.0	1560.7	1138.5	1557.4	854.0
44500	75	1941.4	1376.0	1934.9	1085.4	1934.9	806.4				
	71	1825.1	1559.7	1819.7	1282.9	1819.0	1002.8	1818.7	738.8		
	67	1774.9	1664.5	1708.8	1498.6	1703.3	1195.3	1700.6	927.5	1697.9	659.8
	62	1756.1	1751.0	1658.9	1643.7	1573.5	1450.8	1569.8	1162.8	1566.2	874.9
47000	75	1954.3	1411.3	1945.2	1106.8	1943.1	813.5				
	71	1835.8	1583.8	1829.5	1314.8	1827.8	1021.9	1827.3	745.1		
	67	1792.2	1695.6	1717.4	1532.3	1714.0	1218.8	1708.9	940.6	1703.7	662.5
	62	1776.5	1770.3	1675.9	1657.3	1583.0	1478.5	1579.0	1187.1	1575.1	895.7
49500	75	1967.1	1446.6	1955.6	1128.1	1951.4	820.6				
	71	1846.4	1607.9	1839.2	1346.6	1836.5	1040.9	1835.8	751.4		
	67	1809.5	1726.7	1725.9	1565.9	1724.6	1242.2	1717.1	953.7	1709.6	665.3
	62	1796.9	1789.5	1693.0	1671.0	1592.6	1506.3	1588.2	1211.4	1583.9	916.6
52000	75	1979.9	1481.9	1965.9	1149.5	1959.6	827.8				
	71	1857.1	1632.0	1848.9	1378.5	1845.3	1060.0	1844.4	757.7		
	67	1826.7	1757.8	1734.4	1599.5	1735.3	1265.6	1725.4	966.8	1715.5	668.0
	62	1817.3	1808.8	1710.1	1684.6	1602.1	1534.0	1597.4	1235.7	1592.8	937.4

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

TABLE 9 – COOLING PERFORMANCE DATA* – 150 TON MODEL (CONT'D)

AIR ENTERING EVAPORATOR COIL		OUTDOOR AMBIENT TEMPERATURE 115.0°F									
		ENTERING DRY BULB TEMPERATURE									
CFM	WET BULB (°F)	92.0°F		86.0°F		80.0°F		74.0°F		68.0°F	
		TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH	TMBH	SMBH
32000	75	1770.1	1167.1	1773.0	937.2	1770.3	742.0				
	71	1665.2	1334.7	1658.9	1094.0	1645.6	875.2	1645.2	665.1		
	67	1594.8	1434.1	1559.1	1250.9	1553.5	1041.7	1556.3	827.9	1559.0	614.0
	62	1559.6	1535.1	1481.3	1407.8	1433.8	1230.8	1430.3	1020.1	1426.8	809.4
34500	75	1783.9	1202.3	1784.6	959.9	1782.1	748.2				
	71	1677.1	1374.7	1671.3	1127.0	1659.5	893.5	1660.7	673.0		
	67	1616.4	1475.9	1572.6	1294.2	1566.4	1064.3	1568.4	840.0	1570.5	615.8
	62	1584.9	1563.0	1502.6	1436.8	1445.2	1268.1	1442.2	1044.6	1439.1	821.2
37000	75	1797.7	1237.5	1796.1	982.6	1793.8	754.5				
	71	1689.0	1414.7	1683.7	1160.0	1673.5	911.7	1676.2	680.9		
	67	1638.0	1517.7	1586.1	1337.5	1579.3	1086.9	1580.6	852.2	1582.0	617.5
	62	1610.2	1590.9	1523.9	1465.8	1456.7	1305.4	1454.1	1069.2	1451.5	832.9
39500	75	1811.5	1272.8	1807.7	1005.3	1805.6	760.7				
	71	1700.9	1454.7	1696.0	1193.0	1687.4	930.0	1691.6	688.8		
	67	1659.6	1559.5	1599.6	1380.7	1592.1	1109.5	1592.8	864.4	1593.5	619.3
	62	1635.5	1618.7	1545.2	1494.7	1468.1	1342.7	1465.9	1093.7	1463.8	844.7
42000	75	1825.3	1308.0	1819.2	1028.0	1817.3	766.9				
	71	1712.8	1494.7	1708.4	1226.0	1701.3	948.2	1707.1	696.7		
	67	1681.2	1601.3	1613.1	1424.0	1605.0	1132.1	1605.0	876.6	1605.0	621.0
	62	1660.8	1646.6	1566.5	1523.7	1479.5	1380.0	1477.8	1118.2	1476.1	856.4
44500	75	1838.5	1343.2	1827.6	1048.5	1823.1	772.3				
	71	1724.7	1520.5	1718.5	1253.0	1711.8	962.9	1715.6	701.6		
	67	1695.5	1625.8	1618.6	1454.5	1614.4	1152.4	1609.7	887.6	1605.0	622.8
	62	1680.1	1668.8	1582.9	1548.9	1489.2	1404.0	1486.5	1135.1	1483.7	866.2
47000	75	1851.6	1378.3	1835.9	1069.0	1828.9	777.7				
	71	1736.6	1546.3	1728.7	1280.0	1722.2	977.6	1724.1	706.5		
	67	1709.8	1650.2	1624.1	1485.0	1623.9	1172.7	1614.4	898.6	1605.0	624.5
	62	1699.4	1691.0	1599.2	1574.0	1498.9	1428.0	1495.1	1152.0	1491.4	875.9
49500	75	1864.8	1413.5	1844.3	1089.5	1834.6	783.0				
	71	1748.5	1572.2	1738.8	1307.0	1732.7	992.3	1732.6	711.4		
	67	1724.0	1674.6	1629.5	1515.5	1633.3	1192.9	1619.1	909.6	1604.9	626.3
	62	1718.7	1713.3	1615.6	1599.2	1508.5	1452.0	1503.8	1168.8	1499.0	885.7
52000	75	1877.9	1448.7	1852.6	1110.0	1840.4	788.4				
	71	1760.4	1598.0	1748.9	1334.0	1743.1	1007.0	1741.0	716.3		
	67	1738.3	1699.1	1635.0	1546.0	1642.7	1213.2	1623.8	920.6	1604.9	628.0
	62	1738.0	1735.5	1631.9	1624.3	1518.2	1476.0	1512.4	1185.7	1506.6	895.4

* Rated performance is at sea level. Cooling capacities are gross cooling capacity.

Heating Performance Data – Gas/Electric Heat

GAS HEATING

TABLE 10 - GAS HEAT PERFORMANCE DATA

UNIT	GAS INPUT CAPACITY (BTU/HR X 1000)	MAXIMUM OUTPUT CAPACITY (BTU/HR X 1000)	AIRFLOW MINIMUM	TEMP. RISE (°F)
120–150	1125	900	19350	43

NOTE:
Gas valve rated for 0.5 psig. If gas pressure greater than 0.5 psig, then a gas pressure regulator is required.
Minimum gas pressure is 4.5 iwg.

ELECTRIC HEATING

TABLE 11 - ELECTRIC HEAT PERFORMANCE DATA

UNIT	SIZE (KW)	HEAT CAPACITY (MBH)	AIRFLOW MIN (CFM)	MAX TEMP RISE (°F)
120–150 TON	80	273	15,000	22
	108	369	15,000	28
	150	512	15,000	36
	200	683	15,000	47
	250	854	15,000	44

Supply Fan Data

TABLE 12 - YPAL120–150: 40-INCH AIRFOIL SUPPLY FAN

TOTAL STATIC PRESSURE (INCHES OF WATER COLUMN)										
CFM STD AIR	2.0		3.0		4.0		5.0		6.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
24,000	658	12.6	753	18.5	846	25.2	940	33.3	1027	42.1
26,000	678	14.0	772	20.1	857	26.8	943	34.6	1030	43.6
28,000	700	15.4	792	21.9	872	28.8	952	36.3	1032	45.1
30,000	724	17.0	812	23.8	891	31.0	965	38.5	1039	47.0
32,000	747	18.7	832	25.8	911	33.3	982	41.1	1051	49.4
34,000	771	20.5	854	28.0	931	35.8	1000	44.0	1066	52.4
36,000	796	22.6	878	30.3	951	38.4	1020	46.9	1084	55.7
38,000	822	24.8	901	32.8	973	41.2	1041	50.0	1103	59.1
40,000	848	27.2	925	35.4	995	44.2	1061	53.3	1123	62.7
42,000	875	29.8	949	38.3	1018	47.3	1082	56.7	1144	66.5
44,000	901	32.5	974	41.3	1042	50.7	1104	60.4	1164	70.4
46,000	928	35.4	1000	44.7	1065	54.2	1127	64.2	1185	74.5
48,000	955	38.6	1026	48.2	1089	57.9	1151	68.3	1207	78.9
50,000	983	41.9	1052	51.9	1114	62.0	1174	72.5	1230	83.5
52,000	1011	45.5	1079	55.9	1140	66.2	1198	77.0	1254	88.3

TABLE 13 - YPAL120–150: DUAL DIRECT DRIVE PLENUM (DDP) 330-100 FAN

TOTAL STATIC PRESSURE (INCHES OF WATER COLUMN)										
CFM STD AIR	2.0		3.0		4.0		5.0		6.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
24,000	904	11.2	1017	16.3	1130	21.9	1241	27.9	1349	34.4
26,000	943	12.4	1047	17.7	1151	23.5	1255	29.7	1358	36.4
28,000	984	13.7	1082	19.3	1178	25.3	1275	31.7	1371	38.5
30,000	1027	15.2	1119	21.0	1209	27.3	1299	33.9	1389	40.9
32,000	1072	16.7	1158	22.9	1243	29.4	1328	36.2	1412	43.4
34,000	1117	18.4	1200	24.9	1280	31.6	1359	38.7	1439	46.1
36,000	1163	20.3	1242	27.0	1319	34.1	1394	41.3	1469	49.0
38,000	1209	22.2	1286	29.3	1359	36.6	1431	44.2	1502	52.0
40,000	1257	24.3	1331	31.7	1401	39.4	1469	47.2	1537	55.3
42,000	1304	26.6	1376	34.3	1444	42.3	1509	50.4	1574	58.7
44,000	1352	29.0	1422	37.1	1487	45.3	1551	53.7	1613	62.4
46,000	1401	31.6	1469	40.0	1532	48.6	1593	57.3	NA	NA
48,000	1450	34.3	1516	43.1	1577	52.0	NA	NA	NA	NA
50,000	1500	37.3	1563	46.3	1623	55.6	NA	NA	NA	NA
52,000	1549	40.4	1611	49.8	NA	NA	NA	NA	NA	NA

NOTE: Data is for two fans.
NA = Not Available

Supply Fan Data (Cont'd)

TABLE 14 - YPAL120–150: DUAL DIRECT DRIVE PLENUM (DDP) 330-120 FAN

TOTAL STATIC PRESSURE (INCHES OF WATER COLUMN)										
CFM STD AIR	2.0		3.0		4.0		5.0		6.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
24,000	849	11.0	979	16.5	1107	22.6	1228	29.3	1341	36.3
26,000	878	12.1	998	17.8	1117	24.0	1234	30.9	1345	38.2
28,000	910	13.2	1022	19.2	1133	25.6	1243	32.6	1350	40.1
30,000	944	14.5	1049	20.7	1153	27.3	1256	34.5	1358	42.1
32,000	980	15.9	1078	22.3	1176	29.2	1273	36.5	1370	44.3
34,000	1017	17.4	1110	24.1	1202	31.2	1294	38.7	1385	46.7
36,000	1055	19.0	1144	26.0	1231	33.3	1317	41.1	1404	49.2
38,000	1094	20.7	1179	28.0	1261	35.6	1344	43.6	1426	51.9
40,000	1133	22.5	1216	30.1	1294	38.0	1372	46.2	1450	54.8
42,000	1174	24.4	1253	32.4	1328	40.5	1403	49.0	1477	57.8
44,000	1214	26.5	1291	34.7	1364	43.3	1435	51.9	1506	61.0
46,000	1256	28.7	1329	37.3	1400	46.1	1468	55.1	1536	64.4
48,000	1297	31.1	1368	39.9	1437	49.1	1503	58.4	1568	67.9
50,000	1339	33.6	1408	42.7	1475	52.2	1539	61.9	1602	71.6
52,000	1382	36.2	1449	45.7	1513	55.5	1576	65.5	NA	NA

NOTE: Data is for two fans.
NA = Not Available

Component Static Pressure Drops

TABLE 15 - COMPONENT STATIC PRESSURE DROPS (INCHES OF WATER COLUMN)

SIZE	AIRFLOW CFM STD AIR	DISCHARGE AIR OPENING		120 & 130 TON DAMPERS			150 TON DAMPERS			POWERED EXHAUST AIR DAMPER
		SIDE	BOTTOM	STANDARD OUTSIDE AIR DAMPER & HOODS WITH 1-INCH CLEANABLE FILTERS	LOW LEAK OUTSIDE AIR DAMPER & HOODS WITH 1-INCH CLEANABLE FILTERS	BOTTOM & REAR RETURN AIR DAMPERS	STANDARD OUTSIDE AIR DAMPER & HOODS WITH 1-INCH CLEANABLE FILTERS	LOW LEAK OUTSIDE AIR DAMPER & HOODS WITH 1-INCH CLEANABLE FILTERS	BOTTOM & REAR RETURN AIR DAMPERS	
120–150T	24,000	0.11	0.08	0.18	0.17	0.13	0.13	0.13	0.08	0.018
	26,000	0.13	0.09	0.21	0.20	0.15	0.16	0.15	0.10	0.021
	28,000	0.15	0.11	0.24	0.23	0.17	0.18	0.18	0.12	0.025
	30,000	0.17	0.12	0.28	0.26	0.20	0.21	0.21	0.13	0.029
	32,000	0.19	0.14	0.31	0.30	0.22	0.24	0.23	0.15	0.032
	34,000	0.22	0.16	0.36	0.34	0.25	0.27	0.27	0.17	0.037
	36,000	0.25	0.18	0.40	0.38	0.28	0.31	0.30	0.19	0.041
	38,000	0.27	0.20	0.45	0.43	0.31	0.34	0.33	0.21	0.046
	40,000	0.30	0.22	0.50	0.47	0.35	0.38	0.37	0.24	0.051
	42,000	0.33	0.24	0.55	0.52	0.38	0.42	0.41	0.26	0.056
	44,000	0.37	0.26	0.60	0.58	0.42	0.46	0.45	0.28	0.061
	46,000	0.40	0.29	0.66	0.63	0.46	0.51	0.49	0.31	0.067
	48,000	0.44	0.31	0.72	0.69	0.50	0.55	0.54	0.34	0.073
	50,000	0.47	0.34	0.78	0.75	0.54	0.60	0.59	0.37	0.079
	52,000	0.51	0.37	0.85	0.81	0.59	0.65	0.63	0.40	0.086

Component Static Pressure Drops (Cont'd)

TABLE 15 – COMPONENT STATIC PRESSURE DROPS (INCHES OF WATER COLUMN) (CONT'D)

SIZE	AIRFLOW CFM STD AIR	120T EVAPORATOR COILS		130T/150T EVAPORATOR COILS		RETURN AIR OPENING		DUAL DIRECT DRIVE PLENUM (DDP) SUPPLY FAN	
		WET	DRY	WET	DRY	BOTTOM	REAR	SAFETY GRATE DOWNSTREAM OF ACOUSTIWEIR	INLET SCREEN
120–150T	24,000	0.47	0.29	0.56	0.35	0.02	0.00	0.045	0.408
	26,000	0.51	0.33	0.61	0.40	0.02	0.00	0.049	0.459
	28,000	0.55	0.37	0.66	0.44	0.02	0.00	0.052	0.518
	30,000	0.59	0.41	0.70	0.49	0.02	0.01	0.056	0.586
	32,000	0.63	0.46	0.75	0.55	0.02	0.01	0.060	0.665
	34,000	0.67	0.50	0.80	0.60	0.02	0.01	0.065	0.756
	36,000	0.71	0.55	0.85	0.66	0.02	0.01	0.071	0.861
	38,000	0.75	0.60	0.90	0.72	0.03	0.01	0.077	0.979
	40,000	0.79	0.65	0.95	0.78	0.03	0.02	0.084	1.113
	42,000	0.83	0.71	1.00	0.85	0.03	0.02	0.093	1.264
	44,000	0.87	0.76	1.05	0.91	0.03	0.03	0.102	1.433
	46,000	0.92	0.82	1.10	0.98	0.03	0.04	0.112	1.621
	48,000	0.96	0.88	1.15	1.06	0.03	0.05	0.124	1.830
	50,000	1.00	0.94	1.20	1.13	0.03	0.07	0.137	2.060
	52,000	1.04	1.01	1.25	1.21	0.03	0.09	0.151	2.313

SIZE	AIRFLOW CFM STD AIR	FILTERS							
		2-INCH THROWAWAY	2-INCH CLEANABLE	2-INCH PLEATED, MERV 8	2-INCH CARBON, MERV 8	RIGID FILTER TRACK WITH 2-INCH MERV 8 PREFILTERS	12-INCH MERV 11 WITH 2-INCH MERV 8 PREFILTERS	12-INCH MERV 14 WITH 2-INCH MERV 8 PREFILTERS	FINAL FILTER 12-INCH MERV 14
120–150T	24,000	0.07	0.02	0.08	0.15	0.11	0.26	0.39	0.30
	26,000	0.08	0.02	0.09	0.17	0.12	0.28	0.43	0.34
	28,000	0.09	0.03	0.10	0.18	0.14	0.31	0.47	0.37
	30,000	0.10	0.03	0.11	0.20	0.15	0.34	0.51	0.40
	32,000	0.12	0.04	0.12	0.21	0.17	0.37	0.55	0.43
	34,000	0.13	0.04	0.13	0.23	0.18	0.40	0.60	0.47
	36,000	0.14	0.05	0.14	0.24	0.20	0.44	0.65	0.50
	38,000	0.15	0.05	0.15	0.26	0.22	0.47	0.69	0.54
	40,000	0.16	0.06	0.16	0.27	0.23	0.51	0.74	0.57
	42,000	0.17	0.06	0.17	0.29	0.25	0.54	0.79	0.61
	44,000	0.18	0.07	0.18	0.31	0.27	0.58	0.85	0.64
	46,000	0.19	0.08	0.19	0.32	0.29	0.62	0.90	0.68
	48,000	0.21	0.09	0.21	0.34	0.31	0.66	0.95	0.72
	50,000	0.22	0.09	0.22	0.35	0.33	0.70	1.01	0.75
	52,000	0.23	0.10	0.23	0.37	0.35	0.75	1.07	0.79

NOTES: *Includes 2-inch pleated filters. ** Power exhaust pressure drops are for sizing supply fan.

1. Return air opening pressure drop does not include an exhaust fan. Use the value in the *powered exhaust air damper* column to determine return air pressure drop attributed to the exhaust fan assembly.
2. Front return is not available with barometric relief, exhaust fans, or return fans.
3. Pressure drop for 12-inch rigid filter media includes a 2-inch prefilter.

Electric Heat Pressure Drops

TABLE 16 - ELECTRIC HEATER SIZE AVAILABILITY BY UNIT SIZE

MODEL	80KW	100KW	108KW	150KW	200KW	250KW
YPAL120–150	X	X	X	X	X	X

TABLE 17 - ELECTRIC HEAT AIR PRESSURE DROPS (INCHES OF WATER COLUMN)

SIZE	AIRFLOW CFM STD AIR	80 KW	100 KW	108 KW	150 KW	200 KW	250 KW
120–150T	24,000	0.04	0.08	0.09	0.11	0.14	0.18
	26,000	0.05	0.09	0.10	0.12	0.16	0.21
	28,000	0.06	0.10	0.12	0.14	0.19	0.24
	30,000	0.07	0.12	0.14	0.17	0.22	0.28
	32,000	0.08	0.13	0.15	0.19	0.25	0.31
	34,000	0.09	0.15	0.17	0.21	0.28	0.35
	36,000	0.10	0.17	0.20	0.24	0.31	0.40
	38,000	0.11	0.19	0.22	0.26	0.35	0.44
	40,000	0.12	0.21	0.24	0.29	0.39	0.49
	42,000	0.13	0.23	0.27	0.32	0.43	0.54
	44,000	0.15	0.25	0.29	0.36	0.47	0.59
	46,000	0.16	0.28	0.32	0.39	0.51	0.65
	48,000	0.17	0.30	0.35	0.42	0.56	0.71
	50,000	0.19	0.33	0.38	0.46	0.60	0.77
	52,000	0.20	0.35	0.41	0.50	0.65	0.83

Gas Heat Pressure Drops

TABLE 18 - GAS HEAT AIR PRESSURE DROPS (INCHES OF WATER COLUMN)

SIZE	AIRFLOW CFM STD AIR	1125 MBH
120–150T	24,000	0.20
	26,000	0.23
	28,000	0.27
	30,000	0.31
	32,000	0.35
	34,000	0.40
	36,000	0.45
	38,000	0.50
	40,000	0.55
	42,000	0.61
	44,000	0.67
	46,000	0.73
	48,000	0.80
	50,000	0.87
	52,000	0.94

Exhaust Fan Data

EXHAUST FAN MOTOR SIZING INSTRUCTIONS

In order to determine the proper exhaust fan motor size, add the return duct static pressure to the appropriate damper pressure drop value in *Table 15 on page 40* to get the total static pressure applied to the exhaust fan. Based on the exhaust fan airflow and total static pressure, determine the brake horsepower (BHP) and revolutions per minute (RPM) of the exhaust fan.

TABLE 19 - YPAL120–150: 32-INCH FORWARD-CURVED EXHAUST FAN

CFM STD AIR	TOTAL STATIC PRESSURE (INCHES OF WATER COLUMN)															
	0.25		0.5		0.75		1.0		1.25		1.5		1.75		2	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
24,000	241	5.1	276	6.1	303	6.8	334	8.0	364	9.3	391	10.4	417	11.5	442	12.7
26,000	254	6.3	290	7.4	315	8.2	341	9.2	371	10.6	398	11.9	423	13.2	446	14.4
28,000	268	7.7	303	8.9	329	9.9	351	10.7	377	12.0	405	13.5	430	15.0	453	16.3
30,000	283	9.3	315	10.6	343	11.7	363	12.6	386	13.7	411	15.2	436	16.8	460	18.4
32,000	298	11.1	328	12.4	356	13.8	377	14.8	397	15.7	418	17.0	442	18.7	466	20.5
34,000	313	13.1	341	14.5	369	16.0	391	17.2	409	18.2	428	19.3	450	20.8	472	22.6
36,000	328	15.4	354	16.8	382	18.5	405	19.9	423	21.0	440	22.0	459	23.3	479	25.0
38,000	344	18.0	368	19.4	394	21.1	418	22.8	437	24.1	454	25.1	470	26.3	488	27.7
40,000	360	20.9	382	22.3	407	24.0	431	25.9	451	27.4	467	28.6	483	29.7	499	31.0
42,000	376	24.1	396	25.5	420	27.2	443	29.2	464	30.9	481	32.4	497	33.6	511	34.8
44,000	392	27.6	411	29.0	433	30.8	456	32.7	477	34.7	504	37.2	511	37.7	525	39.0
46,000	409	31.4	426	32.8	447	34.6	468	36.6	490	38.7	509	40.7	524	42.2	539	43.6
48,000	425	35.7	442	37.0	461	38.8	481	40.8	502	43.0	521	45.2	538	47.0	552	48.5
50,000	442	40.2	457	41.5	475	43.3	495	45.4	515	47.6	534	49.9	551	52.0	566	53.8

NOTE: For performance at operating points not included in these tables, consult your local YORK representative.

Return Fan Data

TABLE 20 - YPAL120–150 : 445 PLENUM RETURN FAN

CFM STD AIR	0.25		0.50		0.75		1.00		1.25		1.50	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
24,000	563	5.5	592	6.7	622	8.0	654	9.4	683	10.7	708	12.0
26,000	605	6.8	631	8.0	659	9.4	688	10.9	717	12.4	743	13.8
28,000	647	8.2	672	9.6	697	11.0	724	12.5	751	14.2	777	15.8
30,000	690	9.9	713	11.3	736	12.8	761	14.4	786	16.1	811	17.9
32,000	733	11.8	755	13.3	776	14.9	799	16.5	822	18.3	846	20.1
34,000	776	14.0	797	15.6	817	17.2	838	18.9	859	20.7	881	22.6
36,000	820	16.4	839	18.1	858	19.8	877	21.6	897	23.4	918	25.4
38,000	863	19.1	882	20.9	900	22.7	918	24.5	936	26.4	955	28.4
40,000	907	22.1	924	23.9	941	25.8	959	27.7	976	29.7	994	31.8
42,000	950	25.4	967	27.3	983	29.3	1000	31.3	1016	33.3	1033	35.5
44,000	994	29.0	1010	31.0	1026	33.0	1041	35.1	1057	37.3	1073	39.5
46,000	1038	32.9	1053	35.0	1068	37.2	1083	39.3	1098	41.5	1113	43.8
48,000	1082	37.2	1096	39.4	1111	41.6	1125	43.9	1139	46.2	1154	48.5
50,000	1125	41.9	1140	44.2	1153	46.4	1167	48.8				
CFM STD AIR	**1.75**		**2.00**		**2.25**		**2.50**		**2.75**		**3.00**	
	RPM	**BHP**	**RPM**	**BHP**	**RPM**	**BHP**	**RPM**	**BHP**	**RPM**	**BHP**	**RPM**	**BHP**
24,000	732	13.3	754	14.5	776	15.8	797	17.1	818	18.4	840	19.8
26,000	766	15.2	788	16.6	809	17.9	829	19.3	849	20.7	869	22.1
28,000	801	17.3	823	18.8	843	20.3	863	21.7	882	23.2	900	24.7
30,000	835	19.6	858	21.3	878	22.9	897	24.4	916	26.0	934	27.5
32,000	869	22.0	892	23.8	913	25.6	932	27.3	950	29.0	968	30.7
34,000	904	24.6	926	26.6	947	28.5	967	30.4	985	32.3	1003	34.1
36,000	939	27.5	960	29.5	981	31.6	1001	33.7	1020	35.7	1037	37.7
38,000	975	30.6	995	32.7	1015	34.9	1035	37.1	1054	39.3	1072	41.5
40,000	1012	33.9	1031	36.2	1050	38.5	1069	40.8	1088	43.1	1106	45.4
42,000	1050	37.7	1068	40.0	1086	42.3	1104	44.7	1122	47.2	1140	49.6
44,000	1089	41.7	1106	44.1	1122	46.5	1140	49.0				
46,000	1128	46.1	1144	48.5								
48,000												
50,000												

NOTE: For performance at operating points not included in these tables, consult your local YORK representative.

Electrical Data

ELECTRICAL SERVICE SIZING

In order to use the electrical service required for the cooling only rooftop unit, use the appropriate calculations listed below from U.L. 1995. Based on the configuration of the single package unit, the calculations will yield different minimum circuit ampacity (MCA) and maximum overcurrent protection (MOP).

Using the following load definitions and calculations, determine the correct electrical sizing for your unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Load Definitions:

- **LOAD1** is the current of the largest motor – compressor or fan motor.
- **LOAD2** is the sum of the remaining motor currents that may run concurrently with LOAD1.
- **LOAD3** is the current of the electric heaters (**Note:** zero for cooling only units).
- **LOAD4** is the sum of any remaining currents greater than or equal to 1.0 amp.

Use the following calculations to determine MCA and MOP for units supplied with a single-point power connection:

```
MCA = (1.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4
```

If the MOP does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for MOP is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

TABLE 21 - COMPRESSOR DATA

MODEL	COMPRESSOR		NOMINAL VOLTAGE			
	QTY	MODEL	460/3/60		575/3/60	
			RLA	LRA	RLA	LRA
120	4	ZP182	26.9	173	23.7	132
	2	ZP296	37.8	320	34.6	250
130	2	ZP182	26.9	173	23.7	132
	1	ZP236	30.8	229	25.0	180
	3	ZP296	37.8	320	34.6	250
150	2	ZP182	26.9	173	23.7	132
	2	ZP236	30.8	229	25.0	180
	2	ZP385	54.5	310	49.4	239

NOTE: RLA = running load amps LRA = lock rotor amps

RLA is per compressor.

Electrical Data (Cont'd)

TABLE 22 - SUPPLY/EXHAUST/RETURN MOTOR DATA

ODP - HIGH EFFICIENCY		
MOTOR HP	460/3/60	575/3/60
	FLA	FLA
10	12.5	10
15	18	14.2
20	24	19.1
25	30	24.5
30	36	29
40	49	40
50	57	46
60	68	56
75	N/A	N/A
100	N/A	N/A

TEFC - PREMIUM EFFICIENCY		
MOTOR HP	460/3/60	575/3/60
	FLA	FLA
10	12	9.6
15	18.1	14.6
20	24	19.2
25	31	24
30	38	29
40	48	37
50	58	45
60	67.8	54.4
75	N/A	N/A
100	N/A	N/A

TABLE 23 - POWER SUPPLY VOLTAGE LIMITS

NOMINAL VOLTAGE	POWER SUPPLY	MINIMUM VOLTAGE	MAXIMUM VOLTAGE
480	460V/3Ph/60Hz	414	506
600	575V/3Ph/60Hz	518	632

TABLE 24 - CONDENSER FAN MOTOR FLA

FLA EACH MOTOR		460V/3PH/60HZ	575V/3PH/60HZ
		3.4	2.7
MODEL	**QUANTITY OF FANS**	**460V/3PH/60HZ**	**575V/3PH/60HZ**
YPAL120–150	9	30.6	24.3

TABLE 25 - MISCELLANEOUS ELECTRICAL DATA

DESCRIPTION	NOMINAL VOLTAGE	
	460V	575V
	AMPS	AMPS
Control Transformer 1.5 kVA	3.3	2.6
Convenience Outlet 2.0 kVA	4.4	3.5
Gas Heat 1.5 kVA	3.3	2.6

TABLE 26 - ELECTRIC HEAT

KW	NOMINAL VOLTAGE	
	460V	575V
	AMPS	AMPS
80	96.2	77.0
108	120.3	92.6
150	192.5	154.0
200	240.6	192.5
250	288.7	230.9

NOTE:
1. Heaters will be sized as follows: 460V heaters rated at 480V, 575V heaters rated at 600V.

TABLE 27 - ELECTRICAL HEAT STAGES

		120-150 TONS				
		80KW	108KW	150KW	200KW	250KW
AVAILABLE VOLTAGES	460V/3Ph/60Hz	3	3	4	6	7
	575V/3Ph/60Hz	2	3	4	5	6

CONTROL SEQUENCES FOR VARIABLE AIR VOLUME (VAV) AND SINGLE ZONE VAV (SZVAV)

GENERAL

The control system for the YORK® 120–150 ton single package rooftop unit is fully self-contained and based around a single package unit controller. To aid in unit setup, maintenance, and operation, the single package unit controller is equipped with a user interface that is based around a 4 line x 20 character backlit liquid crystal display (LCD). The LCD displays plain language text in a menu-driven format to facilitate use.

Based on the unit type (variable air volume (VAV) or single zone VAV (SZVAV)), the YORK 120–150 ton single package rooftop units can be operated by a space temperature sensor or standalone. A field wiring terminal block is provided to facilitate unit setup and installation.

In lieu of the hardwired control options, the single package unit controller can be connected to and operated by a building automation system (BAS).

The IPU controller uses the latest technology and provides complete control for the unit along with standard BACnet® MS/TP and Modbus™ remote terminal unit (RTU) communications. The IPU controller also has an SD card slot that can be used to capture historic data on unit operation.

If required, the unit can be equipped with an optional field-installed gateway that allows N2 or Echelon® communications. The E-Link gateway device is field installed and purchased through the advanced order management system (AOMS).

YK-ELNKE01-0 – E-Link for Echelon

YK-ELNKE00-0 – E-Link for N2

UNOCCUPIED/OCCUPIED SWITCHING

Depending on the application, the unit can be indexed between unoccupied and occupied modes of operation by one of three methods, hardwired input, internal time clock, or BAS. A contact-closure input is provided for hardwiring to an external indexing device such as a central time clock or a manual switch. The unit controller is also equipped with a built-in 7-day time clock that can be used in lieu of the contact closure input to switch the unit between unoccupied and occupied modes of operation.

The internal time clock is fully configurable via the user interface and includes holiday scheduling. In addition to the hardwired input or the internal time clock, the unit can also be indexed between unoccupied and occupied modes of operation via a BAS command.

GAS HEATING OPERATION

Units supplied with gas heat can be equipped with one, two, or three independently operated burner modules. Each module is fully self-contained furnace with all necessary ignition controls, safeties, and gas valves. The IPU controller determines how the furnaces are started and stopped and prevents furnace operation if the supply fan airflow is not sufficient or if the supply air temperature (SAT) is excessively high. If a furnace module receives a signal to start from the IPU controller, the ignition control engages the furnace inducer (draft) fan for a 30-second pre-purge cycle. At the end of the 30-second pre-purge, the ignition control will stop the furnace and allows the inducer fan to operate for a 30-second post-purge. Each furnace contains a direct spark ignition system and included safeties for flame and inducer fan verification, high temperature, and flame rollout.

Controls (Cont'd)

HYDRONIC HEAT

If the unit is configured with either of the wet heat options (steam or hot water) the single package unit controls will modulate the hydronic valve to maintain a supply air (SA) setpoint. In the event temperatures off the hydronic coil are below 34.0°F, the fans will shut down and the hydronic valve will open 100%. This function is an automatic reset, so as the temperature rises above 36.0°F, the unit will automatically begin normal operation.

ELECTRIC HEATING OPERATION

For units equipped with electric heaters, the unit can control up to six stages of electric heat, which are staged on based on heating demand calculated by the IPU controller.

MORNING WARM-UP

Morning warm-up can be initialized by BAS or by the IPU controller if the internal scheduling is used. If the internal scheduling is used, the morning warm-up start time is calculated through an adaptive algorithm. When morning warm-up is required, the IPU controller energizes the VAV heat relay, starts the supply fan and qualifies the return air temperature (RAT) for 5 minutes. The internal heat source (gas, hot water/steam, or electric) is controlled to maintain the RAT to the return air (RA) heating setpoint, morning warm-up ends when occupancy occurs (BAS, internal scheduling, or contact closure) or when the maximum morning warm-up time has expired.

ECONOMIZER OPERATION

The unit can be equipped with one of three types of optional economizers: dry bulb, single enthalpy, or comparative enthalpy. When the unit controller determines that outside air is suitable for economizing, the unit controller will control the outside air (OA) damper(s) open to provide economizer cooling. If economizer cooling alone is insufficient for the cooling load, the unit controller shall stage up compressors, one at a time, to meet demand.

The control logic for the three types of economizers is as follows:

Dry Bulb Economizer: The dry bulb economizer is the default economizer control scheme. With the dry bulb economizer, the unit controller monitors the outside air temperature (OAT) only and compares it to a reference temperature setting. Outside air is deemed suitable for economizing when the OAT is determined to be less than the reference temperature setting. This method of economizing is effective, but it is prone to some changeover inefficiencies due to the fact that this method is based on sensible temperatures only and does not take outside air moisture content into consideration.

Single Enthalpy Economizer: With the optional single enthalpy economizer, the unit controller monitors the OA enthalpy in addition to the OAT and compares it to a reference enthalpy setting and a reference temperature setting. Outside air is deemed suitable for economizing when the OA enthalpy is determined to be less than the reference enthalpy setting and the OAT is less than the reference temperature setting. This method of economizing allows the reference temperature setting to be set higher than the dry bulb economizer and is consequently a more efficient single package unit economizer.

Dual Enthalpy Economizer: With the optional dual enthalpy economizer, the unit controller monitors and compares the OA and RA enthalpies in addition to comparing the OAT to the reference temperature setting. Outside air is deemed suitable for economizing when the OA enthalpy is determined to be less than the RA enthalpy and the OAT is less than the reference temperature setting. This method of economizing is the most accurate and provides the highest degree of energy efficiency for a single package unit economizer.

VENTILATION CONTROL SEQUENCES

Minimum Outside Air (OA) Damper Position (VAV Units)

With VAV units, there are two minimum OA damper positions: one when the unit is at full speed and the second when the unit is at approximately half speed. These two points allow the control to linearly reset the position of the OA damper in response to fan speed.

When the unit goes into the occupied mode of operation, the unit controller shall monitor the speed of the supply fan and open the OA damper to a calculated minimum position based on the fan speed. This minimum position shall vary as the speed of the fan changes. The damper shall remain at this calculated position as long as the unit is in the occupied mode and the economizer is not suitable for cooling.

Air Measurement Stations

When the unit is equipped with an air measurement station, the unit controller shall control the OA damper to a measured flow rate through the air measurement station.

When the unit goes into the occupied mode of operation, the unit controller shall control the OA damper to maintain the minimum airflow setpoint through the air measurement station. The unit controller shall control the OA damper to this flow rate as long as the unit is in the occupied mode and the economizer is not suitable for cooling.

NOTE: Ventilation air should not be set below 1,500 CFM. When set lower than the suggested minimum airflow setpoint, the unit controller may not display a reliable CFM.

Demand Ventilation

If optional carbon dioxide (CO_2) sensors are connected to the unit, the unit controller can reset the minimum OA damper position(s) or minimum flow rate based on demand.

The unit controller shall monitor the CO_2 level within the building. If the CO_2 level rises above the CO_2 setpoint, the controller will temporarily increase the minimum OA damper position or minimum OA flow rate to increase ventilation. If the CO_2 level drops below the CO_2 setpoint, the controller will decrease the minimum OA damper position or minimum OA flow rate to decrease ventilation. Demand ventilation shall remain active as long as the unit is in the occupied mode of operation.

EXHAUST CONTROL SEQUENCES

Barometric

The optional barometric exhaust system consists of a lightweight barometric relief damper installed on the end of the unit in the RA section. As more outside air is introduced into the controlled zone due to economizer and ventilation control sequences, the pressure inside the building rises. As building static pressure increases to overcome any exhaust duct static pressure, air will be allowed to escape through the barometric relief damper. Because this type of exhaust is not powered, the amount of air exhausted will be limited to the static pressure that will need to be overcome.

Controls (Cont'd)

Powered Variable Volume Exhaust - Discharge Damper Controlled

This optional variable volume powered exhaust system consists of a fixed speed fan configured with a proportionally controlled discharge damper. The unit controller monitors the pressure inside the building and controls the exhaust damper and the exhaust fan. If the building pressure rises, the exhaust damper is proportionally controlled open and the exhaust fan is controlled ON. If the building pressure falls, the exhaust damper is proportionally controlled closed and the exhaust fan is controlled OFF. The position of the exhaust damper in which the exhaust fan is controlled ON and OFF as well as the building pressure setpoint are user selectable from the user interface.

Powered Variable Volume Exhaust - VFD Controlled

This optional variable volume powered exhaust system consists of an exhaust fan driven by a variable frequency drive (VFD), which is controlled by the unit controller. The unit controller monitors the pressure within the building. As the pressure rises, the VFD is controlled to increase exhaust fan speed. As the pressure falls, the VFD is controlled to decrease exhaust fan speed. The building pressure setpoint is user selectable from the user interface. ON/OFF control is maintained the same as exhaust-discharge damper control stated above.

Return Fan Controlled

This optional variable volume powered return fan system consists of two return fans controlled by one VFD that is controlled by the unit controller. The VFD is controlled to maintain a slightly positive pressure over the mixing box section to prevent reverse flow. As the return and/or exhaust air dampers open, the return plenum pressure drops and the fan will speed up to maintain pressure. When the return and/or exhaust air dampers close, the return plenum pressure increases causing the VFD to slow the fan speed down.

LOW AMBIENT/HEAD PRESSURE CONTROL OPERATION

The unit controller continuously monitors the OAT to determine if mechanical cooling should be allowed. As a safety, if the OAT falls to or below the low ambient lockout temperature, mechanical cooling is prevented from operating. For units with economizers, the low ambient lockout temperature is typically low enough that mechanical cooling will rarely be required. However, for some applications mechanical cooling is required when the OAT is lower than the low ambient lockout temperature.

For these applications, the unit must be equipped with optional low ambient controls. For optional low ambient operation, the unit controller monitors the refrigeration system discharge pressure and takes measures to limit the flow of air across the condenser coil. With the optional low ambient controls, mechanical cooling is allowed down to an OAT of 0.0°F.

SMOKE PURGE SEQUENCES

General

The controls of the rooftop units are designed as standard with a ventilation override sequence to remove, exhaust, or ventilate smoke, fumes, or other airborne contaminates from the occupied space. This feature offers three selectable operations: purge, pressurization, and evacuation. The sequence is activated via one of three binary inputs. A few typical contact closures include smoke detectors, fire alarms, and manual switches.

Purge

Note: All cooling and heating modes are disabled during smoke purge.

Purge shall be used to displace the air inside the space with fresh outside air. When this sequence is started, the following shall occur:

1. Start the supply fan if not already on. (**Note:** With VAV units, the fan speed shall be controlled to maintain the active duct pressure setpoint.)
2. Start the return and exhaust fans if not already on.
3. Set the VFD to 100%.
4. Set the OA damper position to 100% and the exhaust damper to 100%.

Pressurization

Pressurization shall be used to pressurize the building or space in order to force the air inside the space through the walls to adjacent spaces or outside the building envelope. When this sequence is started, the following shall occur:

1. Start the supply fan if not already on. (**Note:** With VAV units, the fan speed shall be controlled to maintain the active duct pressure setpoint.)
2. Stop the return and exhaust fans if on.
3. Set exhaust/return fan VFD to 0%.
4. Set the OA damper to 100% and the exhaust damper to 0%.

Evacuation

Evacuation shall be used to evacuate (negatively pressurize) the building or space in order to draw air through the walls from adjacent spaces or outside the building envelope. When this sequence is started, the following shall occur:

1. Stop the supply fan if on.
2. Start the return and exhaust fans if not already on.
3. Set the exhaust/return fan VFD to 100%.
4. Set the OA damper to 0% and the exhaust damper to 100%.

SPECIFIC SEQUENCES *(See Installation, Operation, and Maintenance manual (Form YRK3-NOM1) for further detail)*

Variable Air Volume (VAV) Mode

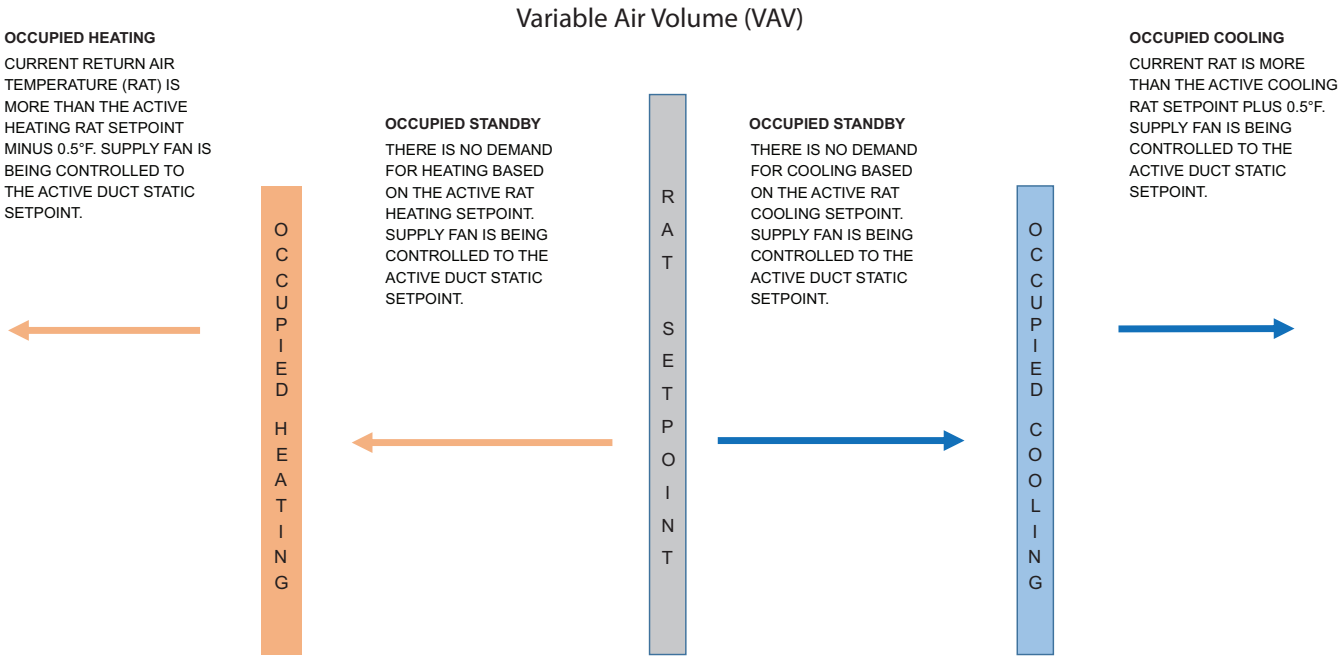
Occupied Cooling – In the occupied cooling mode, the unit controller monitors the RAT and compares it to the RAT cooling setpoint. The RAT cooling setpoint is entered into the unit controller through the setpoint key, cooling subsection of the user interface. If the RAT is equal to or greater than the RAT cooling setpoint plus 0.5°F, the unit controller will place the unit in the occupied cooling mode. The unit will remain in the occupied cooling mode until the RAT is equal to or less than the RAT cooling setpoint minus 0.5°F.

Controls (Cont'd)

Occupied Heating – In the occupied heating mode, the unit controller monitors the RAT and compares it to the RAT heating setpoint. The RAT heating setpoint is entered into the unit controller through the setpoints key, heating subsection of the user interface. If the RAT is equal to or less than the RAT heating setpoint minus 0.5°F, the unit controller will place the unit in the occupied heating mode. The unit will remain in the occupied heating mode until the RAT is equal to or greater than the RAT heating setpoint plus 0.5°F.

Unoccupied Cooling – In the unoccupied cooling mode, the unit controller will monitor the zone temperature and compare it to the unoccupied zone cooling setpoint. The unoccupied zone cooling setpoint is set through the setpoints key, cooling subsection of the user interface. If the zone temperature is equal to or greater than the unoccupied zone cooling setpoint temperature plus 0.5°F, the unit controller will place the unit in the unoccupied cooling mode. The unit will remain in the unoccupied cooling mode until the zone temperature is equal to or less than the unoccupied zone cooling setpoint minus 0.5°F.

Unoccupied Heating – In order for the unoccupied heating mode to function, the night set back setting must be set to enable. This can be done through the program key, heating subsection of the user interface. In the unoccupied heating mode, the unit controller will monitor the zone temperature and compare it to the unoccupied zone heating setpoint. The unoccupied zone heating setpoint is set through the setpoints key, heating subsection of the user interface. If zone temperature is equal to or less than the unoccupied zone heating setpoint minus 0.5°F, the unit controller will place the unit in the unoccupied heating mode. The unit will remain in the unoccupied heating mode until the zone temperature is equal to or greater than the unoccupied zone heating setpoint plus 0.5°F.



NOTES:

1. WHENEVER THE UNIT ENTERS AN ACTIVE COOLING OR HEATING MODE, THE UNIT CONTROLLER WILL UTILIZE AS MANY OR AS FEW STAGES OF COOLING OR HEATING THAT IT NEEDS TO ACHIEVE AND MAINTAIN THE ACTIVE SUPPLY AIR TEMPERATURE (SAT) SETPOINT.
2. UNIT MODES WILL STAGE DOWN WHEN THE ZONE TEMPERATURE IS 0.5°F UNDER THE SETPOINTS FOR COOLING AND 0.5°F OVER THE SETPOINTS FOR HEATING.

LD20073

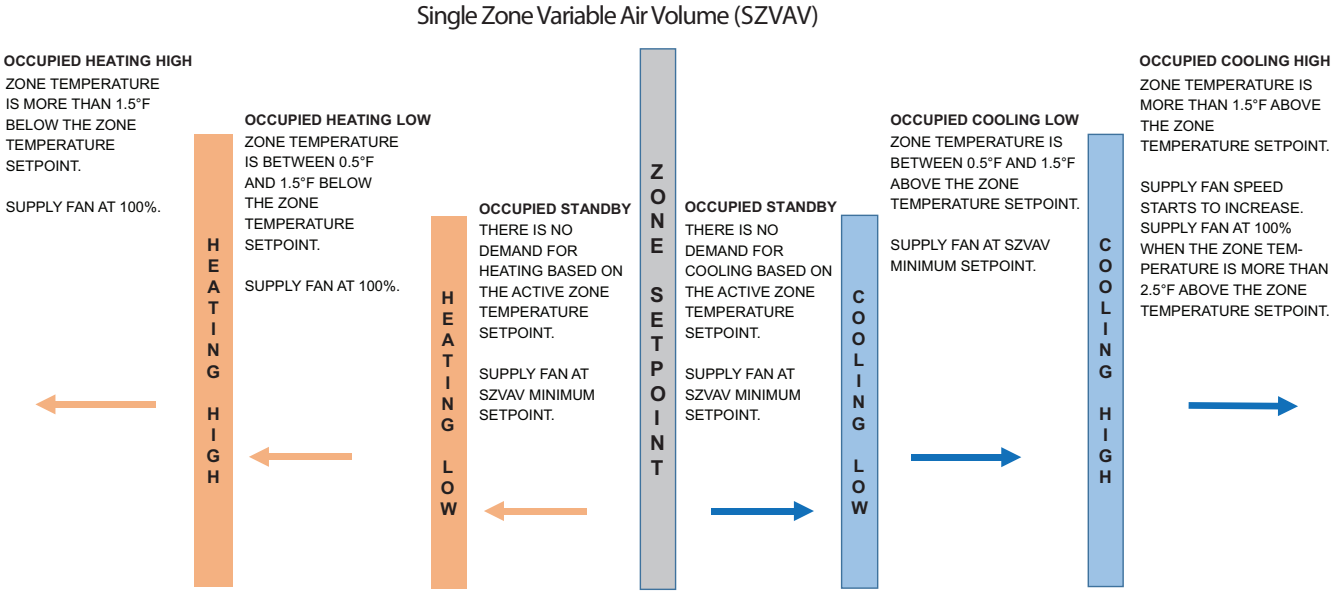
FIGURE 4 - OPERATIONAL MODE: VARIABLE AIR VOLUME (VAV)

Single Zone Variable Air Volume (SZVAV) Mode

Units configured for SZVAV operation shall contain a supply fan VFD. The unit shall switch between cooling mode, heating mode, and standby mode based on zone temperature. In cooling mode, the supply fan speed shall be varied based on zone temperature. If the zone temperature gets warmer, the supply fan speed shall increase. Conversely, if the zone temperature gets cooler, the supply fan speed shall decrease. In heating mode, the supply fan shall run at full speed. When the zone temperature is satisfied, the unit is neither in cooling mode nor heating mode, and the supply fan shall run at minimum speed. Control of cooling and heating stages shall operate as described in the following section.

Unit Mode Determination (Hardwired or Communicated) – The unit compares the analog wired zone temperature or communicated zone temperature input to the occupied zone cooling, occupied zone heating, unoccupied zone cooling, or unoccupied zone heating setpoints to determine the sub-mode of operation. *Figure 5 on page 53* shows what the unit mode would be based on the difference between the zone temperature and the zone temperature setpoints.

The only difference between hardwired and communicated is the method the unit controller uses to determine the zone temperature. In the hardwired mode, the input is an analog input to the control. In the communicated mode, the input is a serial input from a BAS.



NOTES:

1. WHENEVER THE UNIT ENTERS AN ACTIVE COOLING OR HEATING MODE, THE UNIT CONTROLLER WILL UTILIZE AS MANY OR AS FEW STAGES OF COOLING OR HEATING THAT IT NEEDS TO ACHIEVE AND MAINTAIN THE ACTIVE SUPPLY AIR TEMPERATURE (SAT) SETPOINT.
2. UNOCCUPIED SEQUENCE WILL BE THE SAME AS ABOVE EXCEPT THE ZONE TEMPERATURE SETPOINTS USED WILL BE THE UNOCCUPIED SETPOINTS' VALUES.
3. UNIT MODES WILL STAGE DOWN WHEN THE ZONE TEMPERATURE IS 0.5°F UNDER THE SETPOINTS FOR COOLING AND 0.5°F OVER THE SETPOINTS FOR HEATING.

LD19888

FIGURE 5 - OPERATIONAL MODE: SINGLE ZONE VAV (SZVAV)

Controls (Cont'd)

COOLING OPERATION

Zone Sensor Control

If a zone sensor controls the unit, the unit controller shall maintain the zone temperature setpoint. This setpoint is user selectable at the user interface.

When a zone sensor is used for control, the unit controller will monitor the temperature within the space and control the unit accordingly. A closed-loop staging algorithm is used to stage compressors up and down as required to maintain the desired zone temperature setpoint. If the unit is equipped with an economizer, outside air conditions are continuously monitored by the control to determine if conditions are suitable for economizing. If conditions are suitable for economizing, the unit controller will modulate the OA damper in addition to staging compressors up and down to maintain the zone temperature setpoint.

HEATING OPERATION

Zone Sensor Control

If a zone sensor controls the unit, the unit controller shall maintain all zone temperature setpoints. These setpoints are user selectable at the user interface.

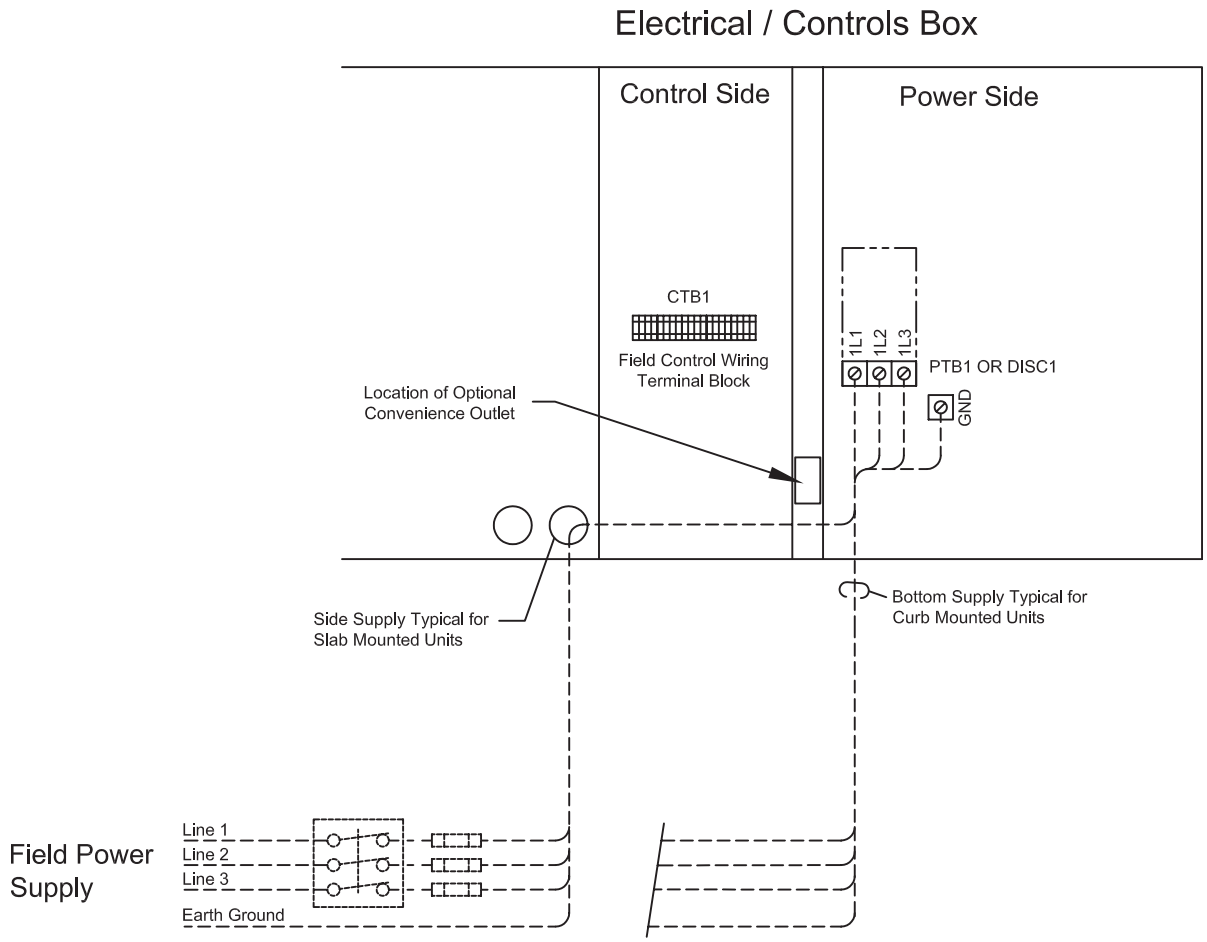
When a zone sensor is used for control, the unit controller will monitor the temperature within the space and control the unit accordingly. A closed-loop staging algorithm is used to stage heating steps up and down as required to maintain the desired zone temperature setpoint. If the unit is equipped with an economizer, outside air conditions are continuously monitored by the control to determine if conditions are suitable for economizing. If conditions are suitable for economizing, the unit controller will modulate the OA damper in addition to staging heating steps up and down to maintain the zone temperature setpoint.

TABLE 28 - THREE-PHASE POWER SUPPLY CONDUCTOR SIZE RANGE

120–150 TON UNIT				
SUPPLY VOLTAGE	SINGLE POINT TERMINAL BLOCK	SINGLE POINT DISCONNECT	DUAL POINT TERMINAL BLOCK	
			TERMINAL BLOCK 1	TERMINAL BLOCK 2
460V	6 AWG thru 500 kcmil (2 per phase)	3/0 thru 500 kcmil (2 per phase)	2 AWG thru 300 kcmil (2 per phase)	14 AWG thru 2/0 (1 per phase)
575V	6 AWG thru 500 kcmil (2 per phase)	3/0 thru 500 kcmil (2 per phase)	2 AWG thru 300 kcmil (2 per phase)	14 AWG thru 2/0 (1 per phase)

Power Wiring: YPAL120–150

UNIT POWER SUPPLY WIRING, STANDARD SINGLE POINT WITH OR WITHOUT DISCONNECT



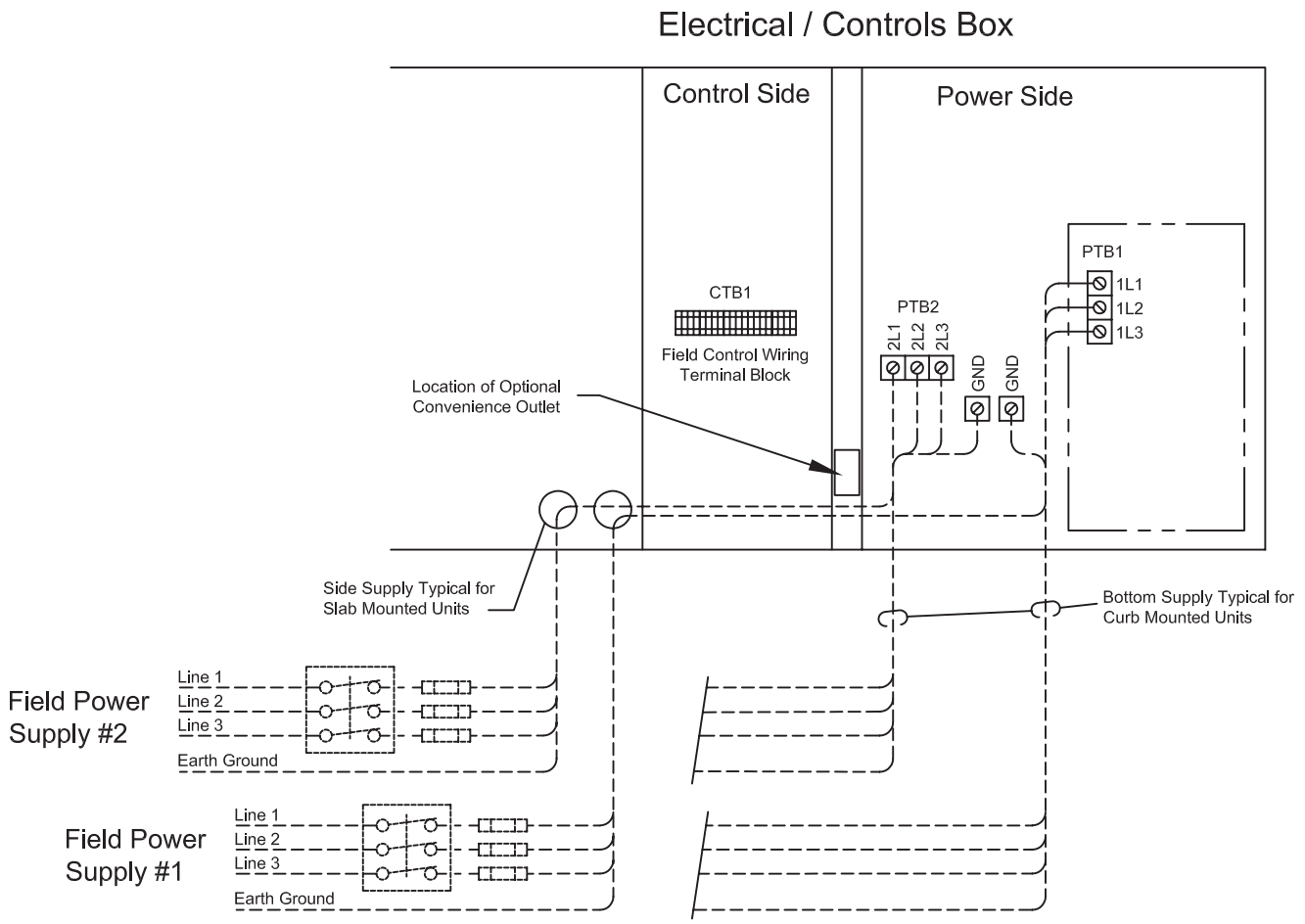
NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Consult the *Installation, Operation, and Maintenance (IOM) manual (YRK3-NOM1)* manual or unit nameplate data to determine minimum circuit ampacities (MCAs) and recommended dual element fuse sizes.
4. MCA is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
5. Maximum dual element fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22)
6. Use copper conductors only.
7. On units with an optional disconnect switch, the supplied disconnect switch is a *Disconnecting Means* as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a load break device.

FIGURE 6 - SINGLE POINT POWER SUPPLY WIRING

Power Wiring: YPAL120–150 (Cont'd)

UNIT POWER SUPPLY WIRING, OPTIONAL DUAL POINT

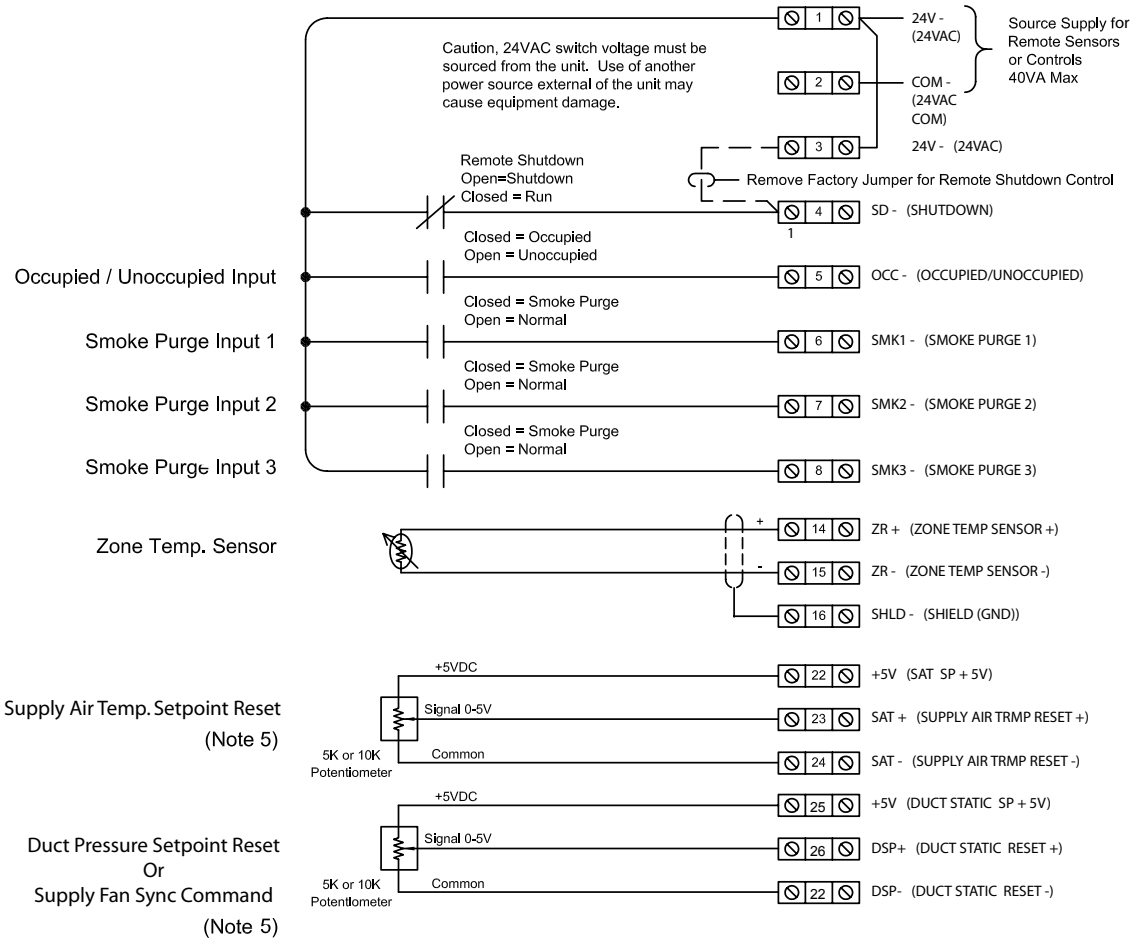


NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Consult the *IOM manual (YRK3-NOM1)* manual or unit nameplate data to determine minimum circuit ampacities (MCAs) and recommended dual element fuse sizes.
4. MCA is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
5. Maximum dual element fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22)
6. Use copper conductors only.
7. On units with an optional disconnect switch, the supplied disconnect switch is a *Disconnecting Means* as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a load break device.

FIGURE 7 - DUAL POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT

Field Control Wiring



NOTES:

1. Wiring shown indicates typical wiring. Refer to the *Installation, Operation, and Maintenance (IOM) manual* (*Form YRK3-NOM1*) for more detailed wiring methods and options
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24VAC terminal is 40VA.
4. Use shielded wire where shown.
5. Potentiometer application shown. As an alternative, signal inputs can be driven from an analog output of a third party controller. *Input resistance is 15 K ohms.

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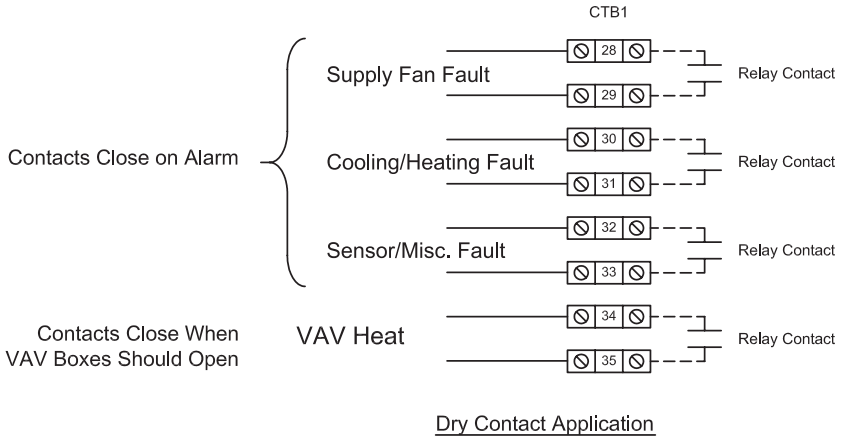
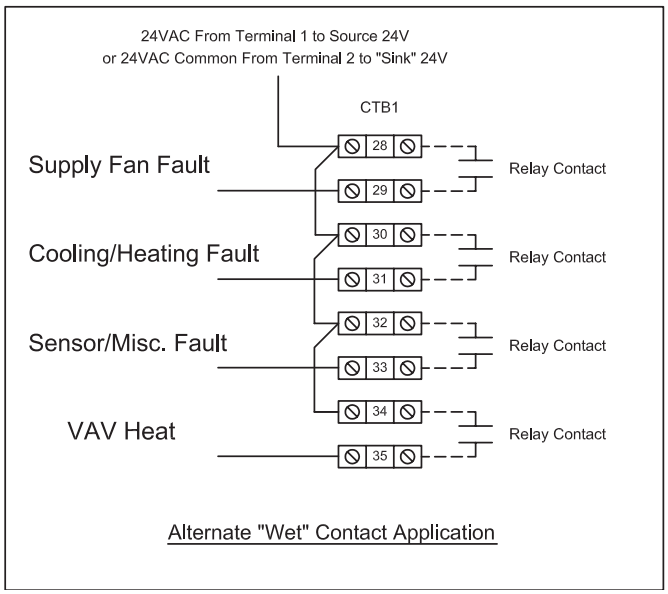
FIGURE 8 - FIELD CONTROL WIRING - INPUTS

Field Control Wiring (Cont'd)





Wiring Notes:

1. Wiring shown indicates typical wiring. Refer to the *IOM manual* (*Form YRK3-NOM1*) for more detailed wiring methods and options
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24VAC terminal is 40VA.
4. Use shielded wire where shown.
5. Relay contacts suitable for pilot duty to 1A from 24VAC to 120VAC.

LD08186

FIGURE 9 - FIELD CONTROL WIRING - OUTPUTS

General Arrangement Drawing – 120–150 Ton Models

BOTTOM SUPPLY / BOTTOM RETURN / POWERED RETURN / ECONOMIZER / ELECTRIC HEAT / ANGLED FILTERS

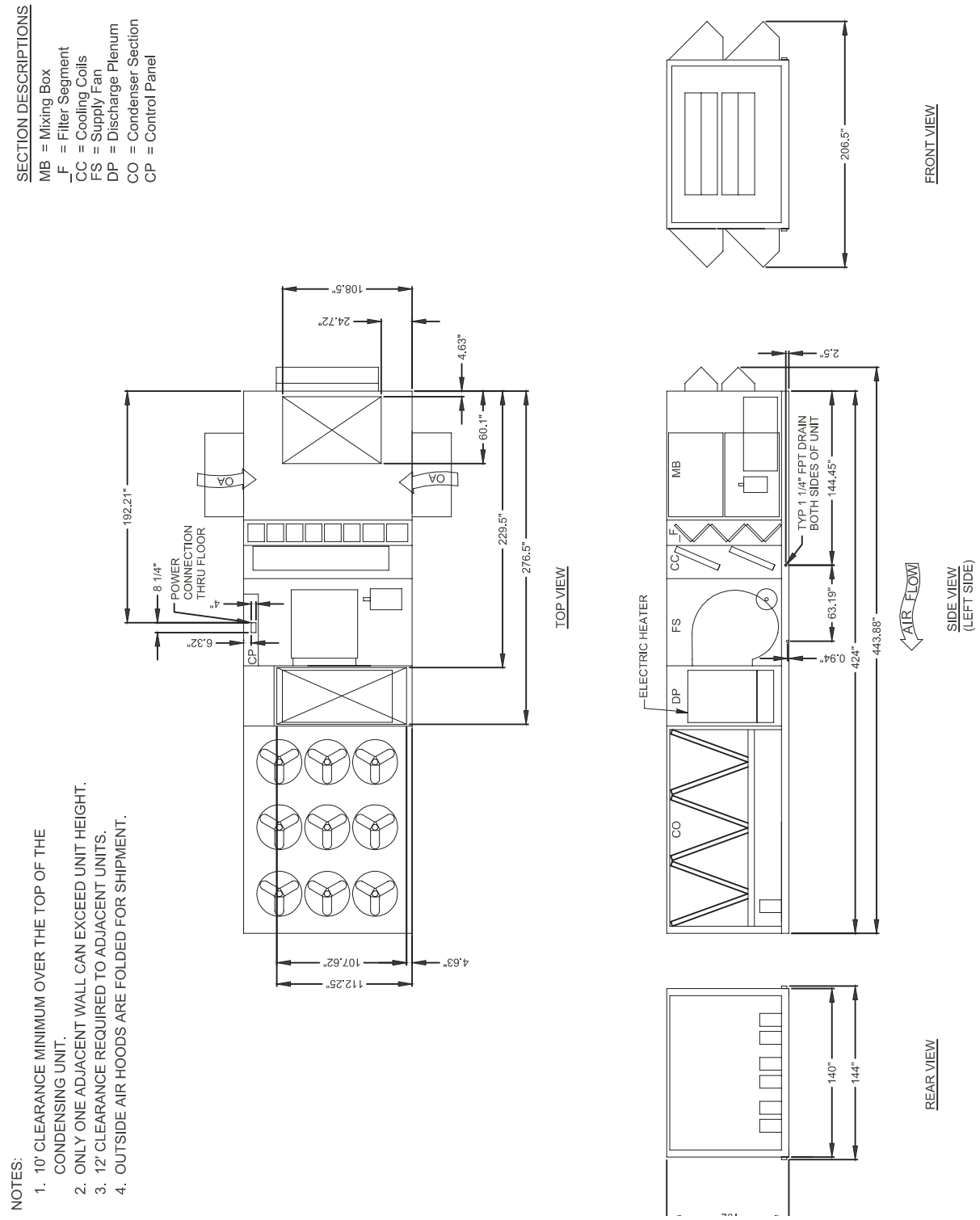
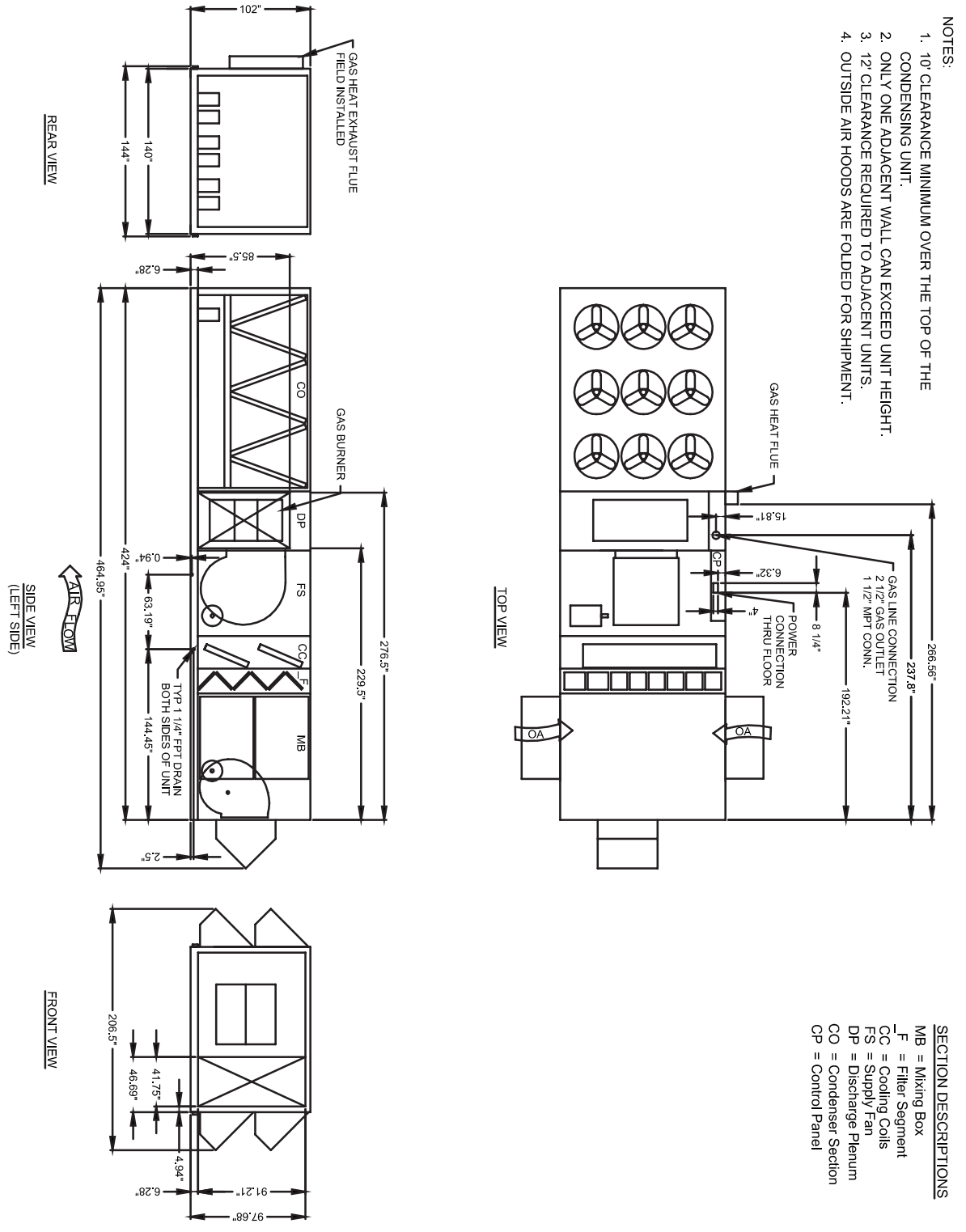


FIGURE 10 - GENERAL ARRANGEMENT DRAWING

General Arrangement Drawing – 120–150 Ton Models (Cont'd)

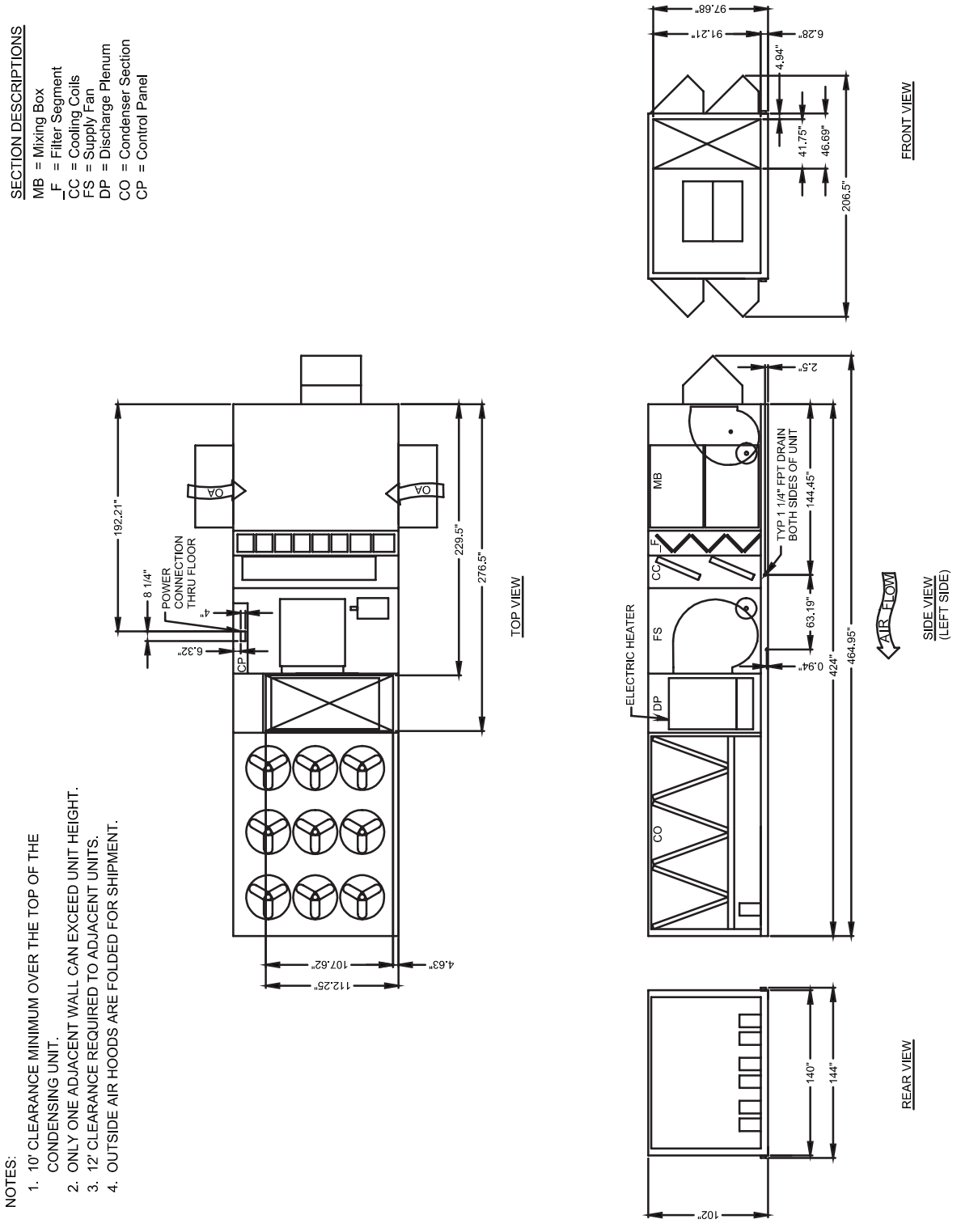
LEFT SUPPLY / FRONT RETURN / POWERED EXHAUST / ECONOMIZER / GAS HEAT / ANGLED FILTERS



LD08172

FIGURE 10 - GENERAL ARRANGEMENT DRAWING (CON'TD)

BOTTOM SUPPLY / FRONT RETURN / POWERED EXHAUST FAN / ECONOMIZER / ELECTRIC HEAT / ANGLED FILTERS



LD08175

FIGURE 10 - GENERAL ARRANGEMENT DRAWING (CON'TD)

General Arrangement Drawing – 120–150 Ton Models (Cont'd)

BOTTOM SUPPLY / BOTTOM RETURN / POWERED EXHAUST / ECONOMIZER / GAS HEAT / ANGLED FILTERS

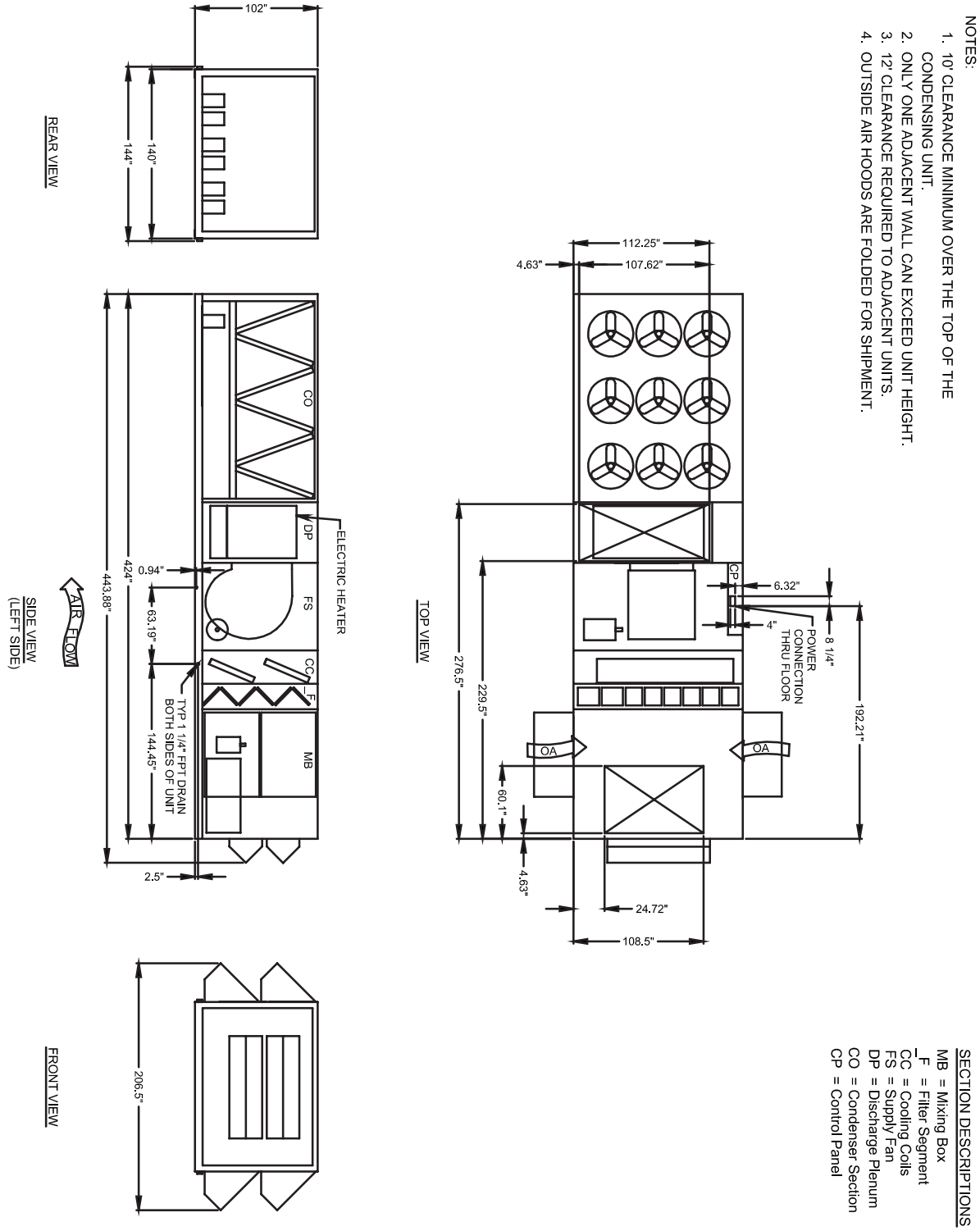
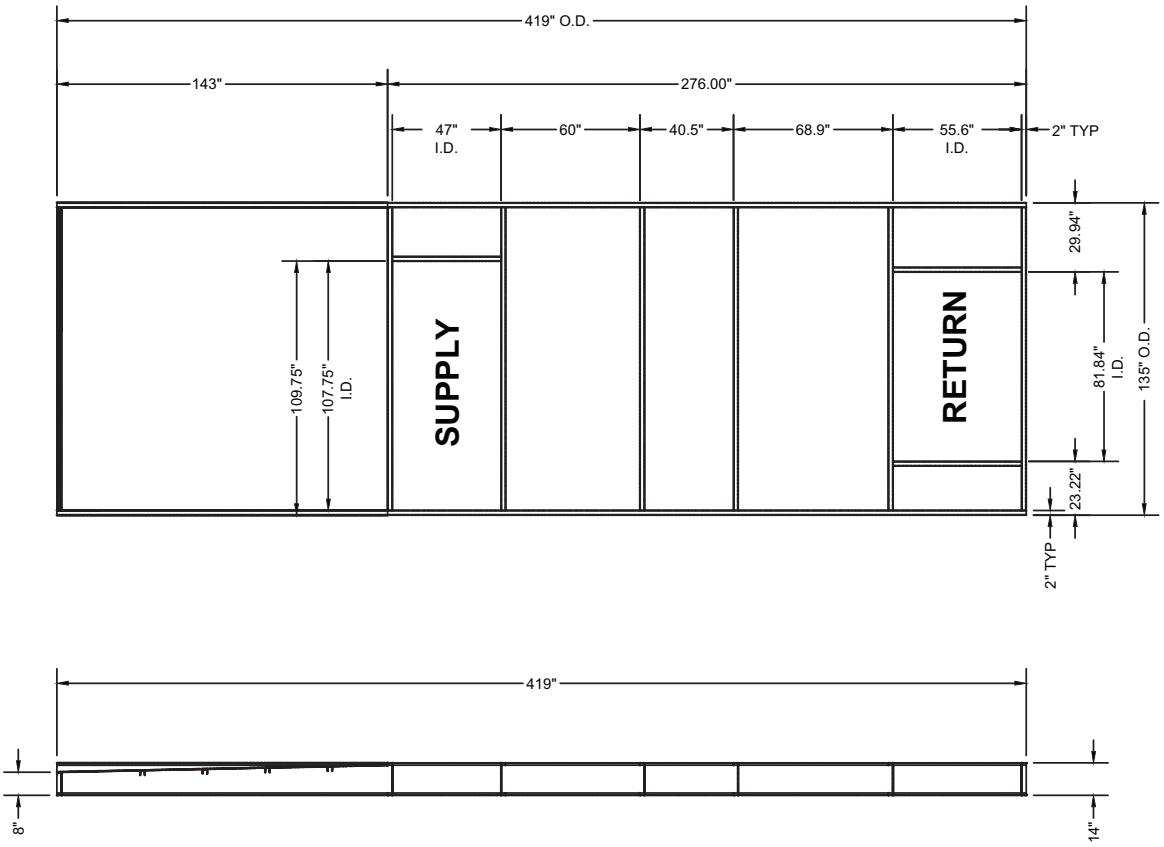


FIGURE 10 - GENERAL ARRANGEMENT DRAWING (CON'TD)

CURB LAYOUT DRAWING / 120–150 TON STANDARD CABINET



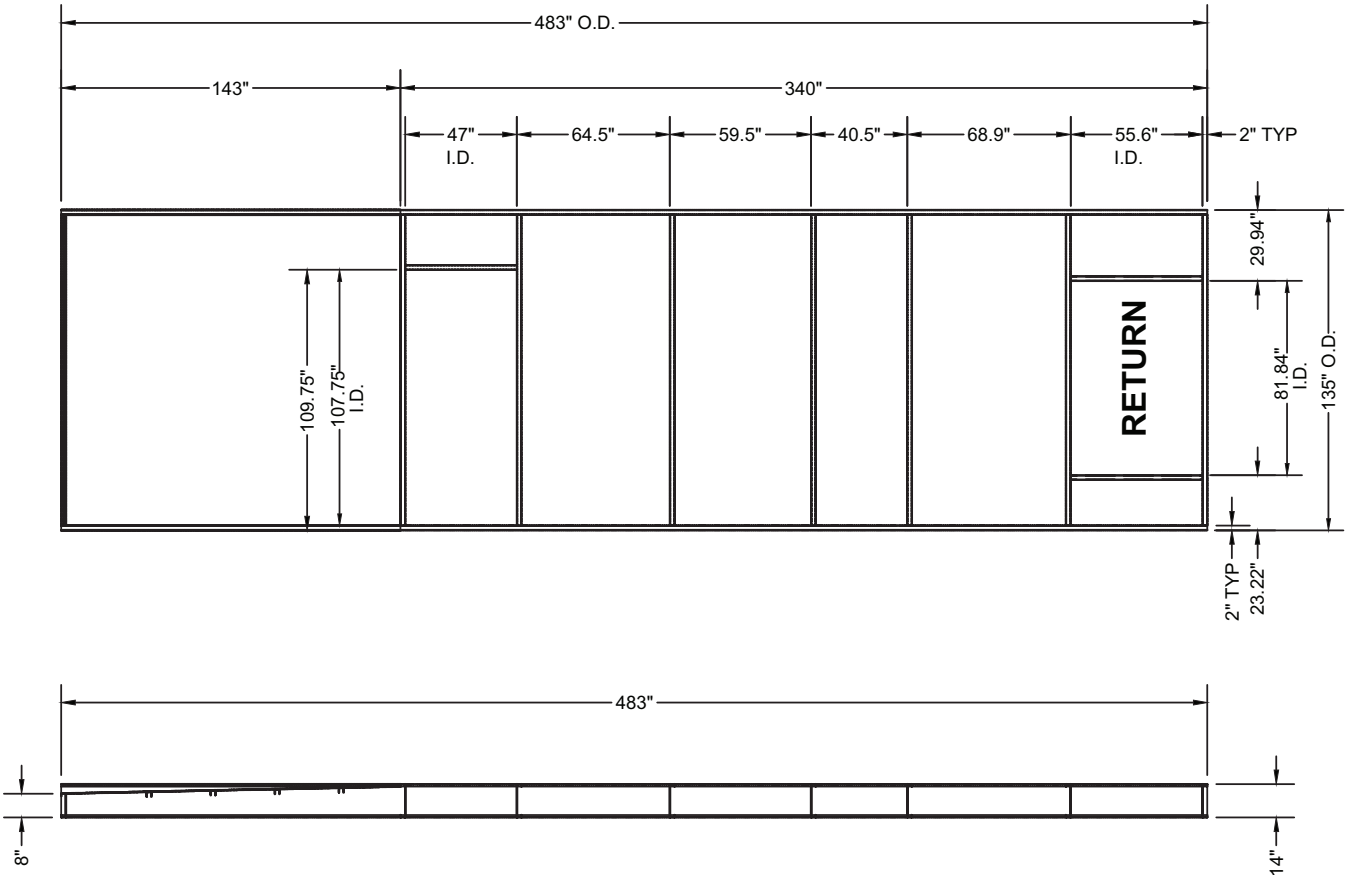
NOTES:

1. Unit must be installed square and level.
2. Curb configuration for bottom return and bottom supply.
3. These drawings are not intended as construction documents for the field fabricated roof curbs. YORK will not be responsible for the unit fit up, leak integrity, or sound level for installation using field fabricated roof curbs.
4. The unit does not have a base pan under the condensing section of the unit. Field fabricated roof curbs must have a cap on the top of the condensing section of the curb to prevent moisture from entering the space. The cap design must be sloped away from the supply duct opening to the end of the unit for the drainage of the moisture off of the top of the cap.
5. Depicted above is a full perimeter curb.

FIGURE 10 - GENERAL ARRANGEMENT DRAWING (CON'TD)

General Arrangement Drawing – 120–150 Ton Models (Cont'd)

CURB LAYOUT DRAWING / 120–150 TON EXTENDED CABINET



NOTES:

1. Unit must be installed square and level.
2. Curb configuration for bottom return and bottom supply.
3. These drawings are not intended as construction documents for the field fabricated roof curbs. YORK will not be responsible for the unit fit up, leak integrity, or sound level for installation using field fabricated roof curbs.
4. The unit does not have a base pan under the condensing section of the unit. Field fabricated roof curbs must have a cap on the top of the condensing section of the curb to prevent moisture from entering the space. The cap design must be sloped away from the supply duct opening to the end of the unit for the drainage of the moisture off of the top of the cap.
5. Depicted above is a full perimeter curb.

FIGURE 10 - GENERAL ARRANGEMENT DRAWING (CON'TD)

Hot Water/Steam Coil Connection Locations

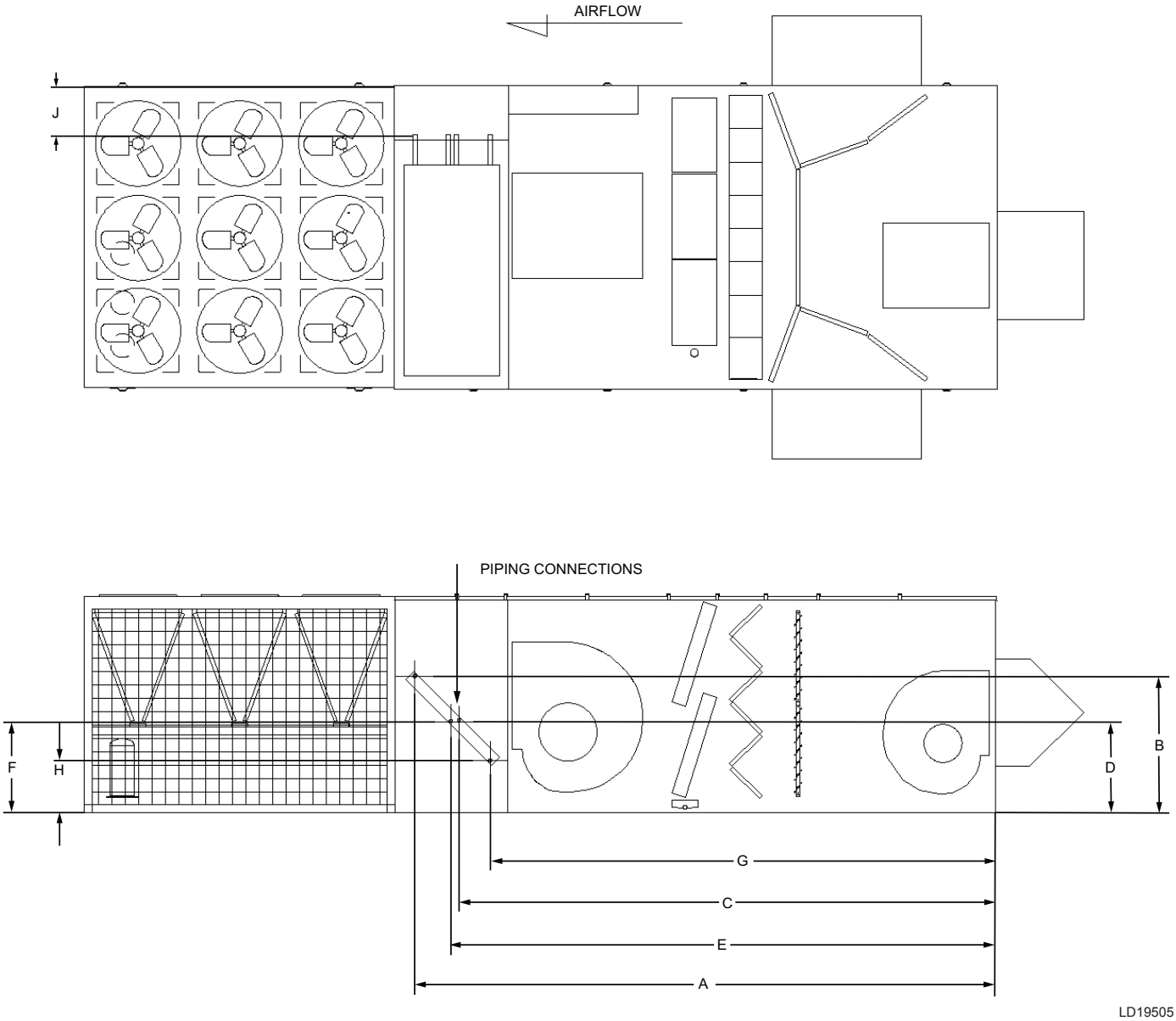


TABLE 29 - FITTING LOCATION DIMENSIONS

	A	B	C	D	E	F	G	H	J	CONNECTION SIZE (INCHES)	
	NOTE 1	NOTE 3	NOTE 1	NOTE 3	NOTE 2	NOTE 4	NOTE 2	NOTE 4	NOTE 5	SUPPLY	RETURN
HOT WATER	270.35	63.53	250.90	44.09	254.79	43.73	235.35	24.29	23.85	2 FPS	2 FPS
STEAM	253.74	43.38	-	-	234.47	24.11	-	-	26.95	2 MPT	1.5 MPT

NOTES:

1. Location of supply line connection, horizontal from economizer corner post, in direction of airflow
2. Location of return line connection, horizontal from economizer corner post, in direction of airflow
3. Location of supply line connection, vertical from bottom edge of base rail
4. Location of return line connection, vertical from bottom edge of base rail
5. Location of both supply and return lines, horizontal from outside casing of unit, across direction of airflow

MPT = Male Pipe Thread FPS = Female Pipe Sweat

Power/Control Entry Drawing – 120–150 Ton Models

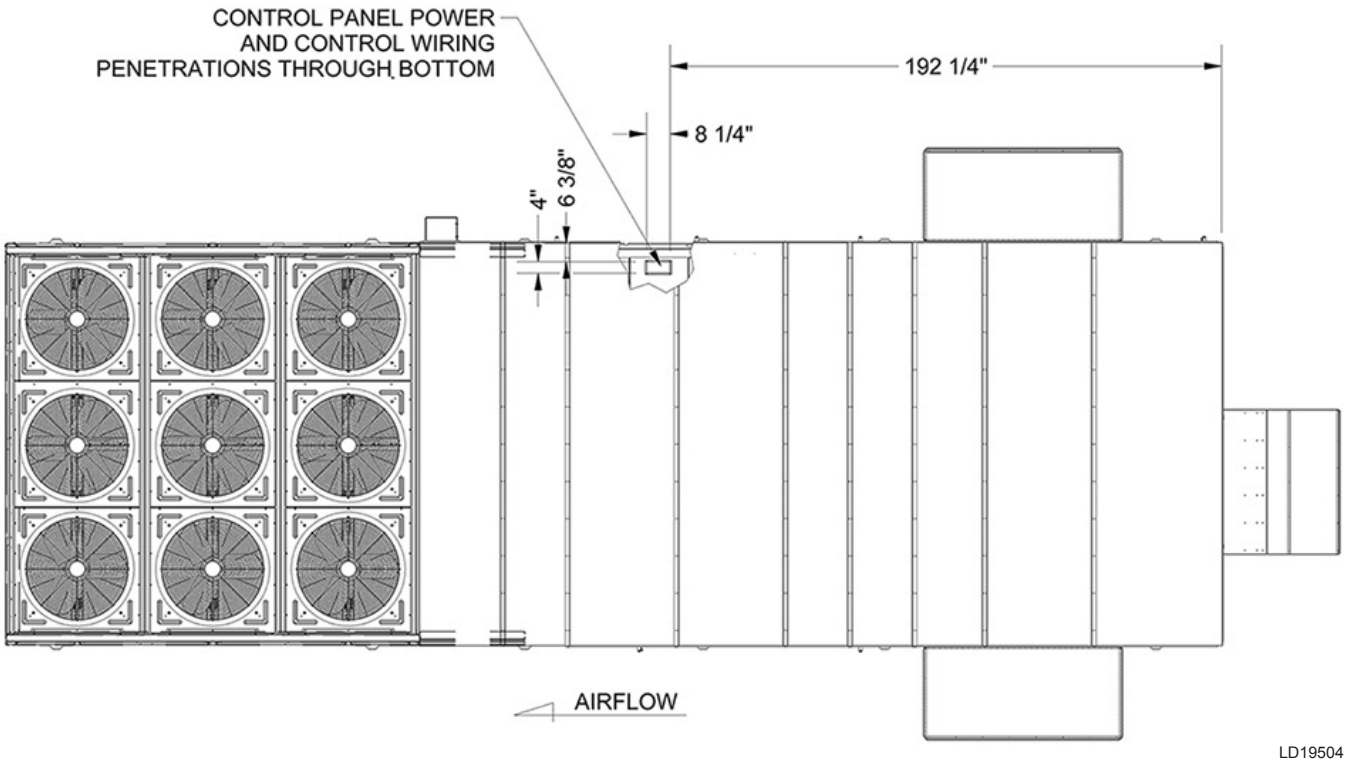


FIGURE 11 - POWER/CONTROL WIRING LOCATION

Guide Specifications

GENERAL

Scope

The requirements of the General Conditions, Supplementary Conditions, Division 1, and Drawings apply to all work herein.

Provide microprocessor-controlled, air-cooled, double-wall construction outdoor single package unit air conditioning product of the scheduled capacities and performance as shown and indicated on the drawings, including but not limited to:

1. Single-piece single package unit package
2. Charge of refrigerant and oil
3. Electrical power and control connections
4. Supply and return duct connections
5. Factory start-up

Quality Assurance

All units are tested, rated, or certified, as applicable, in accordance with the following standards, guidelines, and codes:

1. All units shall meet the latest ASHRAE 90.1 minimum energy efficiency ratio (EER).
2. All units shall meet the latest ASHRAE 62 requirements for ventilation and indoor air quality (IAQ).
3. All units shall be rated in accordance with the ARI Standard 340/360.
4. All units shall be tested to ANSI/UL 1995 and CAN/CSA C22.2 No. 236 standards.
5. Gas heating units shall be designed in conformance with ANSI Z21.47-2006/ CSA2.3-2006 standards and be ETL listed.
6. Units shall be ETL and ETL Canada listed.

Manufacturers: The design shown on the drawing is based upon products of the manufacturer scheduled. Alternate equipment manufacturers shall be acceptable if equipment meets the scheduled performance and complies with these specifications. If equipment manufactured by manufacturer other than that scheduled is utilized, then the mechanical contractor shall be responsible for coordinating with the general contractor and all affected subcontractors to ensure proper provisions for installation of the furnished unit. This coordination shall include, but not be limited to, the following:

1. Structural supports for units.
2. Roof curb transition.
3. Piping size and connection/header locations.
4. Electrical power requirements and wire/conduit and overcurrent protection sizes.
5. All costs incurred to modify the building provisions to accept the furnished units.

Guide Specifications (Cont'd)

Warranty: Manufacturer shall warrant all equipment and material of its manufacture against defects in workmanship and material for a period of 18 months from date of shipment.

1. The warranty shall include parts only during this period.
2. The warranty shall not include parts associated with routine maintenance, such as belts, air filters, etc.

Delivery and Handling

Unit shall be delivered to the job site fully assembled, wired, and charged with refrigerant and oil by the manufacturer.

Unit shall be stored and handled per manufacturer's instructions.

All handling and storage procedures shall be per manufacturer's recommendations.

Submittals

Shop Drawings: Shop drawing submittals shall include, but are not limited to, the following: drawings indicating components; dimensions; weights; required clearances; location, type, and size of field connections; and power and control wiring connections.

Product Data: Product data shall include dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gauges and finishes of materials.

Documentation

1. Fan curves with specified operating point clearly plotted shall be provided.
2. Product data of filter media, filter performance data, filter assembly, and filter frames shall be provided.
3. Electrical requirements for power supply wiring; including wiring diagrams for interlock and control wiring shall be supplied. Factory and field-installed wiring shall be clearly indicated.
4. Operation and maintenance documentation shall be supplied in accordance with Section 01 78 23 (01830) – Operation and Maintenance Data, including but not limited to instructions for lubrication, filter replacement, compressor, motor and drive replacement, coil cleaning, filter maintenance, spare parts lists, and wiring diagrams.

Warranties

Equipment shall include the manufacturer's warranty not less than 18 months from the date of shipment.

Extended parts warranty [optional] shall be included for an additional 1 [5] year.

Extended parts and labor warranty [optional] shall be included for an additional 1 [5] year.

EQUIPMENT

Product Specification

Summary: Completely factory-assembled, unitized construction single [two-piece unit, consisting of condenser section and air handler section] package air conditioning unit including a factory-mounted and wired unit controller and sensors, single-point power connection 460V [/575V] 3-phase, 60Hz power supply, outside air handling section with return and supply openings, discharge plenum, direct expansion (DX) refrigerant condensing section.

Factory Test: The refrigerant circuit shall be pressure-tested, evacuated, and fully charged with refrigerant [nitrogen holding charge on two-piece units] and oil. The completed refrigerant circuit shall undergo a factory helium leak test, an automated operational run test, and quality inspection prior to shipment. The unit controller shall be configured and run tested at the factory to minimize field setup time. If the unit is not configured and tested, then the manufacturer shall provide field start-up and testing to ensure that the controller is functioning properly.

The rooftop unit shall be tested and certified to meet the seismic standards of the 2012 International Building Code and ASCE 7-06. The unit shall be APPROVED for seismic application when properly installed, used as intended, and contains a Seismic Certification Label referencing the Certificate of Compliance. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as IP=1.5, certified to a maximum Design Structural Response Acceleration at Short Periods (Sds) of up to 1.4 g. The unit shall be labeled to reflect this.

Unit Construction

Base Rail: The unit shall include an integral design base rail with lifting points clearly marked and visible on the base rail and a 1-1/4-inch female pipe thread (FPT) connection for condensate drainage. The unit base shall be designed with a recessed curb mounting location. The recessed curb mounting surface shall provide a continuous surface for field application of curb gasketing to create a weather-tight seal between the curb and unit.

Casing: Casing shall be complete post and panel construction with exterior skin. All panels, doors, walls, uprights, floor panels, and roofing shall be 1-inch thick, 1-1/2 pound density insulation. Units are specifically designed for outdoor installation. Air handling section shall be of double-wall construction, including doors, walls, and corner posts.

Roof: The unit roof shall be bowed with the peak in the middle of the unit and sloped to both sides of the unit for drainage. A drip lip shall run the length of the unit to prevent water drainage down the side of the unit. Roof and sidewall seams shall be continuously caulked and covered with formed galvanized seam caps. All panel fasteners shall be secured through standing seams to prevent fastener penetrations that are exposed to the air stream.

Paint: Exterior painted surfaces are designed to withstand a minimum of 1,000 salt spray hours when tested in accordance with ASTM B-117.

Markings and Diagrams: All necessary tags and decals to aid in the service and/or indicating caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access door.

Documentation: Installation and maintenance manuals shall be supplied with each unit.

Guide Specifications (Cont'd)

Access Doors: Double-wall access doors shall be provided in the fan, coil, filter, and inlet sections of the unit on both sides of the unit. Doors shall be double-wall construction with a solid liner and a minimum thickness of 1-inch. Doors shall be attached to the unit with piano-type stainless steel hinges. Latches shall be positive-action, creating an airtight seal between the door and unit. Panels and doors shall be completely gasketed with a closed-cell, neoprene gasket. Door tiebacks shall be provided for all doors to secure them while servicing.

Economizer Type

[SELECT NONE OR ONE OF THE FOLLOWING]

1. **No Outside Air:** The unit has no provisions for outside ventilation air.
2. **Manual Outside Air (OA) Damper:** A manually adjustable OA damper capable of admitting 0–25% outside air shall be provided.
3. **Modulating Economizer:** This option includes modulating outdoor air and return air dampers that are interlocked (mechanical interlock) and positioned by fully modulating, solid-state damper actuators. Control of the damper is via a standard ambient outdoor air dry bulb sensor, or optional single or comparative enthalpy controls.
4. **Two-Position Outside Air (OA) Damper:** A two-position OA damper capable of admitting 0–25% outside air shall be provided. The minimum position shall be manually adjustable from 0–25%. Control shall be based on the occupied mode of the unit. For occupied mode, the damper shall be open to the minimum position and for unoccupied, it shall be closed.
5. **Modulating Economizer:** The economizer segment shall be designed to use outside air for cooling and ventilation and provide a means of exhausting air from the air handling unit. The segment shall consist of parallel acting low-leak dampers. The return air (RA), OA, and exhaust air (EA) dampers shall be sized for 100% of nominal unit airflow. The EA damper assembly shall have a factory-assembled rain hood. The rain hood shall have a drip-lip the full width of the hood to channel moisture away from the air being drawn into the unit.

Economizer Leakage

[SELECT ONE OF THE FOLLOWING]

1. Damper assemblies are low-leak design. Damper blades are fabricated from a minimum of 16-gauge galvanized steel. Blade edges are covered with vinyl seals.
2. Damper assemblies have a maximum leakage rate of 10 CFM/sq. ft. at 1-inch water column (iwg) when tested in accordance with AMCA Standard 500 and have a longevity of 60,000 damper opening and closing cycles, complying with the requirements of California Title 24.

[SELECT ONE OF THE FOLLOWING TYPES OF BUILDING PRESSURE CONTROL]

1. **No Building Exhaust/Relief:** The unit has no provisions to exhaust building return air.
2. **Barometric Relief Damper:** Building air exhaust shall be accomplished through barometric relief dampers installed in the return plenum. The dampers open relative to the building pressure. The opening pressure shall be adjustable.
3. **On/Off Fan Powered Exhaust:** A double width, double inlet (DWDI) Class II forward-curved centrifugal exhaust fan shall be provided to exhaust building return air to relieve building static pressure. The fans shall be constant volume and operate based on either a building static pressure or OA damper position.

4. **Powered Exhaust with Modulating Discharge Damper:** A DWDI Class II forward-curved centrifugal exhaust fan shall be provided to exhaust building return air to relieve building static pressure. The fans shall operate at a constant volume and operate based on building static pressure. Exhaust airflow shall be modulated via a parallel-acting control damper. The EA dampers shall be sized for 100% of the exhaust airflow.

5. **Powered Exhaust with Variable Frequency Drive (VFD):** A twin DWDI Class II forward-curved centrifugal exhaust fan shall be provided to exhaust building return air to relieve building static pressure. Exhaust airflow shall be modulated via a factory installed and commissioned variable frequency drive (VFD) with the same nameplate horsepower as the supply fan motor.

6. **Power Return Fan:** A single width, single inlet (SWSI) plenum fan shall be provided to draw return air from the building to the single package unit. An access door shall be provided on at least one side of the unit for fan/motor access. The return fan shall operate to maintain a constant pressure within the return plenum.

7. **Power Return Fan with Exhaust:** A SWSI plenum fan shall be provided to draw return air from the building to the single package unit. An access door shall be provided on at least one side of the unit for fan/motor access. The return fan shall operate to maintain a constant pressure within the return plenum. A discharge damper shall be provided to modulate building exhaust. The damper shall be controlled via building pressure. The RA damper shall be linked with the OA damper to modulate volumes of return and outside airflows.

[FOR POWERED EXHAUST OR RETURN FAN OPTIONS ABOVE, USE THE FOLLOWING]

1. **Fan Motor:** Fan motors shall be NEMA design ball-bearing types with electrical characteristics and horsepower as specified. Motors shall be 1750 RPM, open drip-proof (ODP) type [total enclosed fan-cooled (TEFC) optional]. [Optional shaft grounding rings on motors increase motor longevity when applied with a VFD.] The motor shall be located within the unit on an adjustable base.

2. **Mountings:** Fan and fan motor shall be internally mounted and isolated on a full width isolator support channel using 1-inch springs [2-inch springs and seismic restraints optional]. The fan discharge shall be connected to the fan cabinet using a flexible connection to ensure vibration-free operation.

3. **Bearings and Drives:** Fan bearings shall be self-aligning, pillow block, or flanged type regreaseable ball bearings and shall be designed for an average life (L50) of at least 200,000 hours. All bearings shall be factory lubricated and equipped with standard hydraulic grease fittings and lube lines extended to the motor side of the fan. Fan drives shall be selected for a 1.5 service factor and anti-static belts shall be furnished. All drives shall be fixed pitch. Fan shafts shall be selected to operate well below the first critical speed and each shaft shall be factory coated after assembly with an anti-corrosion coating.

   Optional Belt Guards: Belt guards shall be provided to enclose the drive and sheave package as a safeguard while servicing the fan section.

   Optional Airflow Measurement: The DWDI forward curved exhaust fans [SWSI plenum return fans] shall be supplied with piezorings. Airflow measurement ring shall be supplied for integration into a field-supplied controller. Field to provide required transducer, tubing, and wiring harness.

Guide Specifications (Cont'd)

Filter Section

[SELECT A FILTER RACK, FILTER MEDIA, AND SWITCH IF DESIRED]

1. **Angled Filter Rack:** 2-inch carbon media MERV 7 filters shall be provided in an angled filter rack.
2. **Angled Filter Rack:** 2-inch cleanable filters shall be provided in an angled filter rack.
3. **Angled Filter Rack:** 2-inch high-efficiency (30%) MERV 8 pleated filters shall be provided in an angled filter rack.
4. **Flat Filter Rack:** 60–65% efficient MERV 11 rigid filters with a 2-inch high-efficiency pleated pre-filters shall be provided in a flat filter rack.
5. **Flat Filter Rack:** 90–95% efficient MERV 14 rigid filters with a 2-inch high-efficiency pleated pre-filters shall be provided in a flat filter rack.
6. **Optional Dirty Filter Alarm:** A dirty filter switch shall be provided and wired to the single package unit control panel. Upon closure of the switch, the controller shall display a dirty filter fault. The setting of the switch can be changed manually to close at a specified pressure drop across the filters. Dirty filter switch shall be provided as a default for the downstream filter rack whenever it is selected for the upstream filter rack.
7. **Optional Magnehelic Gauge:** A flush mounted, factory installed differential pressure gauge shall be provided to measure pressure drop across both filter banks. Tubing shall be provided with the gauges.

Evaporator Section

1. **Cooling Coil:** Evaporator coils shall be DX type with intertwined circuiting to assure complete coil face activity during part load operation. Coil tubes shall be 1/2-inch outside diameter (OD) copper with internally enhanced tubes. Fins shall be enhanced mechanically, expanded to bond with the copper tubes. Coil casing shall be fabricated from heavy gauge galvanized steel. All coils shall be pressure-tested at a minimum of 450 psig.
2. **Indoor Air Quality (IAQ) Drain Pan:** The main coil drain pan shall be double-sloped of stainless steel construction with a condensate connection through the base rail of the unit. Clearance between the evaporator coil and the drain pan shall allow for easy access to the drain pan for cleaning and shall be visible for inspection without the removal of components.
3. **Intermediate Drain Pan:** Coils with finned height greater than 48 inches shall have an intermediate drain pan extending the entire finned length of the coil. The intermediate pans shall have drop tubes to guide condensate to the main drain pan.

Supply Fan Section

1. **Fan:** The fan section shall be equipped with a single DWDI airfoil type wheel for horizontal discharge. An access door shall be provided on both sides of the unit for fan/motor access.
    a. **Mountings:** Fan and fan motor shall be internally mounted and isolated on a full width isolator support channel using 1-inch springs [2-inch springs and seismic restraints optional]. The fan discharge shall be connected to the fan cabinet using a flexible connection to ensure vibration-free operation.

b. **Bearings and Drives:** Fan bearings shall be self-aligning, pillow block, or flanged type regreaseable ball bearings and shall be designed for an average life (L50) of at least 200,000 hours. All bearings shall be factory lubricated and equipped with standard hydraulic grease fittings and lube lines extended to the motor side of the fan. Fan drives shall be selected for a 1.5 service factor and anti-static belts shall be furnished. All drives shall be fixed pitch. Fan shafts shall be selected to operate well below the first critical speed and each shaft shall be factory coated after assembly with an anti-corrosion coating.

c. **Optional Variable Frequency Drive (VFD) Manual Bypass:** A three contactor manual bypass shall be provided to permit replacement of the VFD in the event of a power failure.

d. **Optional Belt Guard:** Belt guards shall be provided to enclose the drive and sheave package as a safeguard while servicing the fan section.

e. **Supply Fan Airflow Measurement:** The DWDI forward-curved [airfoil] supply fan shall be supplied with a piezoring. Airflow measurement ring shall be supplied for integration into a field-supplied controller. Field to provide required transducer, tubing, and wiring harness.

2. **Direct Drive Plenum (DDP) Supply Fan:** The fan section shall be equipped with two SWSI airfoil plenum wheels. Plenum fans shall be direct drive. An access door shall be provided on both sides of the unit for fan/motor access.

   a. **Mountings:** Fan and fan motor shall be internally mounted and isolated on a full width isolator support channel using 1-inch springs [2-inch springs and seismic restraints optional].

   b. **Acoustiweir™:** Unit shall include a discharge air (DA) sound attenuation barrier. The passive sound attenuator barrier shall be mounted on the downstream side of the supply fan and shall block line-of-sight between the fan and the unit discharge opening. If not available, manufacturer must provide a sound attenuator of at least 3 feet in length.

   c. **Thrust Restraints:** Provide horizontal thrust restraints between air handling unit casing and fan housing.

   d. **Supply Fan Airflow Measurement:** The SWSI supply fan shall be supplied with an airflow measurement device. Airflow measurement device shall be capable of measurement accuracy of +/-5%. Airflow measurement ring and transducer shall be supplied for integration into a field-supplied controller.

   e. **Fan Inlet Screen:** Unit shall be provided with a fan inlet screen.

   f. **Safety Grate:** Safety grates capable of supporting a 300 pound center load shall be provided over bottom supply air (SA) opening.

3. **Fan Motor:** Fan motors shall be NEMA design ball-bearing types with electrical characteristics and horsepower as specified. Motors shall be 1750 RPM [1175 RPM], ODP type [TEFC optional]. [Optional shaft grounding rings on motors increase motor longevity when applied with a VFD.] The motor shall be located within the unit on an adjustable base.

Guide Specifications (Cont'd)

4. **Variable Air Volume (VAV) Fan Control:** VAV supply fan control shall be accomplished by using a VFD matched to the supply fan motor horsepower. The VFD shall include an integral DC line reactor to reduce harmonic distortion in the incoming and outgoing power feeds. If a DC line reactor is not provided, an AC line reactor must be provided. Inlet guide vanes shall not be acceptable. VFD control keypads shall be located in the control cabinet for accessibility and servicing while the unit is operating.

Discharge Plenum

[SELECT ONE OF THE FOLLOWING HEAT/NO HEAT CONFIGURATIONS]

1. **Cooling Only:** The discharge air temperature (DAT) sensor shall be located in the discharge plenum and be located such that it accurately measures the supply air temperature (SAT). Walls shall be lined with a solid liner to prevent erosion of the insulation and separate insulation from the air stream.

2. **Staged Gas Heat:** The heating section shall include an induced draft furnace in six stages of heating capacity.

    a. **Heat Exchanger:** The heat exchanger shall be constructed of tubular aluminized steel [stainless steel] with stainless steel flue baffles and flue assembly.

    b. **Burner and Ignition Control:** The burner shall include a direct-driven induced-draft combustion fan with energy efficient intermittent pilot spark ignition, redundant main gas valves with pressure regulator.

    c. **Combustion Air Fan:** The inducer fan(s) shall maintain a positive flow of air through each tube to expel the flue gas and to maintain a negative pressure within the heat exchanger relative to the conditioned space.

    d. **Safety Devices:** A high limit controller with automatic reset to prevent the heat exchanger from operating at an excessive temperature shall be included. A centrifugal switch on the induced draft fan motor shaft shall prevent ignition until sufficient airflow is established through the heat exchanger. A rollout switch shall provide secondary airflow safety protection. The rollout switch shall discontinue furnace operation if the flue becomes restricted.

    e. **Flue:** The furnace flue shall be shipped loose to protect it from damage during transit. The flue shall be field-mounted by the installing contractor. The flue outlet shall be located above the unit to help prevent recycling of combustion gases back through the heat exchanger.

    f. **Agency Certification:** Gas heating sections are both ETL listed to both U.S. and Canadian safety standards.

3. **Modulating Gas Heat:** The heating section shall include an induced draft furnace in 24:1 modulation of heating capacity.

    a. **Heat Exchanger(s):** The heat exchanger(s) shall be constructed of tubular aluminized steel [stainless steel] with stainless steel flue baffles and flue assembly.

    b. **Burner(s) and Ignition Control:** The burner(s) shall include a direct-driven induced-draft combustion fan with energy efficient intermittent pilot spark ignition, redundant main gas valves with pressure regulator.

    c. **Combustion Air Fan(s):** The inducer fan(s) shall maintain a positive flow of air through each tube to expel the flue gas and to maintain a negative pressure within the heat exchanger relative to the conditioned space.

d. **Safety Devices:** A high limit controller with automatic reset to prevent the heat exchanger from operating at an excessive temperature shall be included. A centrifugal switch on the induced draft fan motor shaft shall prevent ignition until sufficient airflow is established through the heat exchanger. A rollout switch shall provide secondary airflow safety protection. The rollout switch shall discontinue furnace operation if the flue becomes restricted.

e. **Flue:** The furnace flue shall be shipped loose to protect it from damage during transit. The flue shall be field-mounted by the installing contractor. The flue outlet shall be located above the unit to help prevent recycling of combustion gases back through the heat exchanger.

f. **Agency Certification:** Gas heating sections are both ETL listed to both U.S. and Canadian safety standards.

4. **Electric Heat:** An electric slip-in heater is installed within the single package unit discharge plenum to provide the heating requirements per the schedule shown on the plans. The electric heater is wired in such a manner as to provide a minimum of two steps of capacity.

   a. **Heat Exchanger:** The furnace is an industrial grade design using an open coil made of the highest grade resistance wire containing 80% nickel and 20% chromium. The resistance coils are adequately supported in the air stream using ceramic bushings in the supporting framework. Terminals of the coil are stainless steel with high temperature ceramic bushings.

   b. **Safety Devices:** The primary high temperature protection is an automatic reset type thermal cut out. Secondary protection is an automatic reset type thermal cut out. Secondary protection is a replaceable thermal link.

   c. **Agency Certification:** The operation of the electric heater is an integral part of the single package units control system. Power connection to the heater is through the power panel for the unit. Electric heat is ETL listed to both U.S. and Canadian safety standards.

5. **Hot Water Heating Coil:** A hot water coil shall be installed in the single package unit discharge plenum.

   a. **Construction:** The hot water coil shall have 8 [10, 12, 14] fins per inch, 2 tubes per circuit, and an 2-inch inlet and outlet connection. Primary surface shall be 1/2-inch OD copper tube, staggered in direction of airflow. Connections have 1/4-inch FPT drain plug on each connection. A structural galvanized steel casing shall protect the coil. An intermediate coil support shall be provided. The coil shall be circuited to provide free draining and venting through one vent and drain. Freezestat shall be provided to prevent coil freeze-up.

   b. **Testing:** Completed coil, including headers, connections, and return bends shall be tested with 325 pounds compressed air underwater. Coils shall be designed for operation at 250 psig design working pressure.

6. **Steam Heating Coil:** A steam heating coil shall be installed in the single package unit discharge plenum.

   a. **Construction:** The steam coil shall be constructed in the non-freeze style. The steam coil shall have 6 fins per inch, a 2-inch inlet connection, and 1-1/2-inch outlet connection. Tubes shall be 1-inch OD seamless copper tubing with a minimum wall thickness of 0.035-inch and expanded into the fin collars for maximum fin-tube bond. Inner distributing tubes shall be 5/8-inch OD seamless cop-

Guide Specifications (Cont'd)

per tubing with a minimum wall thickness of 1/4-inch. All header connections shall be of red brass or steel with male pipe threads (MPTs) and silver braze to headers. Casing shall be galvanized steel. The core shall be pitched in the direction of the condensate connection for proper drainage. Freezestat shall be provided to prevent coil freeze-up.

b. **Testing:** The completed coil, including headers and connections, shall be tested underwater with 325 pounds compressed air to ensure a leak-free coil.

7. **Diffuser Section:** For applications with an extended discharge plenum with downstream filtration or heating, a diffuser section is provided. A diffuser shall be included to distribute the airflow from the fan evenly across the heating coil or filter bank to optimize coil/filter life and effectiveness. The diffuser shall be sized for 50% free area and provide adequate upstream and downstream clearance to minimize air-side pressure drop.

[FOR EXTENDED DISCHARGE PLENUMS, SELECT ONE OF THE FOLLOWING]

1. **Downstream Final Filter Rack:** A 12-inch rigid filter rack and filters shall be provided downstream of the supply fan and diffuser segment for hospital applications. The filter shall be 90–95% efficient MERV 14. A magnahelic pressure gauge shall be included and visible from the outside of the unit for servicing and code compliance. A dirty filter switch shall be provided with the downstream final filter rack to alert the user of clogged filters. If a dirty filter switch is selected for the final filter rack, it shall be provided as default with the upstream filter rack.

2. **Blank Section:** A blank section shall be provided downstream of the supply fan and diffuser section.

Condenser Section

1. **Condenser Fans:** Condenser fans shall be matched up with compressors to optimize system control. Condenser fans shall be propeller type, directly driven by permanently lubricated totally enclosed air over (TEAO) motor.

2. **Condenser Coil:** Condenser coils shall be all aluminum micro-channel coils or seamless copper tubes, arranged in staggered rows, mechanically expanded into the aluminum fins. Coils are configured in a V-bank configuration, with individual flat coils rotated from the vertical plane for protection from hail damage for each condensing circuit. Condensing coils shall have a subcooler for more efficient, stable operation.

3. **Compressors:** Units shall use industrial-duty hermetic scroll compressors, piped and charged with oil and POE R-410A refrigerant. Compressors shall have an enlarged liquid carrying capacity to withstand rugged operating conditions. Compressor frame shall be cast iron, with cast iron fixed and orbiting scrolls. Each compressor shall feature a solid state protection module, designed to protect the compressor from over-temperature and over-current conditions. Compressors shall be vibration-isolated from the unit and installed in an easily accessible area of the unit. All compressor-to-pipe connections shall be brazed to minimize potential for leaks. Each compressor shall include a replaceable suction screen, discharge line check valve, and oil sight glass.

4. **Compressor Capacity Modulation:** Unit shall include six compressors of varying size to provide 14–100% of cooling during normal operation. The compressor sequence of operation shall reduce typical temperature change to less than 2.0°F at the unit discharge at full design airflow. Unit shall not require hot gas bypass and the inherent energy usage it requires to properly operate the unit. Upon entering cool-

ing mode from other modes, the unit controller will estimate the cooling requirement and match it closely to the capacity in order to reduce the time required to satisfy the cooling requirements. After the initial calculation, the unit controller will add or reduce stage(s) as necessary to establish a balance between the unit capacity and the space cooling load.

5. **Low Ambient:** Compressors shall operate down to 0.0°F [optional] by monitoring the refrigeration system discharge pressure and adjusting condenser airflow to maintain the proper head pressure to protect compressor operation. Refrigerant pressure transducers shall be included and provide the discharge pressure on the single package unit control display.
6. **In-Line Liquid Line Driers [Replaceable Core Liquid Line Driers]:** Refrigerant piping includes check valves, thermal expansion valves with replaceable thermostatic elements, high and low pressure switches, and anti-recycling timing device to prevent compressor restart for 5 minutes after shutdown.
7. **Condenser Wire Grill [Optional Louvered Condenser Enclosure or No Enclosure]:** The condenser section shall be enclosed by a wire grill [louvered or none] condenser enclosure on the three exposed sides. Paint finish shall match the color and salt spray specifications of the unit exterior.
8. **Compressor Sound Treatment [Optional]:** Compressor sound blankets shall be provided to attenuate radiated sound from the compressors.
9. **Service Valves [Optional]:** Liquid, suction, and discharge service valves shall be included to provide a means of isolating the refrigerant charge in the system so that the refrigeration system may be serviced without removing the charge of the unit.

Controls

1. **Enclosure:** Unit shall be shipped complete with factory configured, installed, wired, and tested single package unit controller housed in a rain and dust-tight enclosure with hinged, latched, and gasket sealed door.
2. **Short Circuit Current Rating:** Unit shall have a 5,000 amp rating. [Unit shall have a 65,000 amp rating. Over-current protection must be Class J (field-provided) to obtain the 65,000 short circuit current rating (SCCR) rating.] [The unit shall be provided with stand alone 65,000 amp SCCR equipment and ampere interrupting capacity (AIC) rating.]
3. **Basic Controls:** Control shall include automatic start, stop, operating, and protection sequences across the range of scheduled conditions and transients. The unit controller shall provide automatic control of compressor start/stop, energy saver delay and anti-recycle timers, condenser fans, and unit alarms. Automatic reset to normal operation after power failure. Software stored in non-volatile memory, with programmed setpoints retained in lithium battery backed real time clock (RTC) memory for minimum 5 years. 80-character liquid crystal display (LCD), descriptions, and numeric data in English (or metric) units. The sealed keypad shall include buttons for setpoints, display, entry, unit options, clock, and an on/off switch.
4. **Diagnostics:** Upon start-up, the unit controller shall run through a self-diagnostic check to verify proper operation and sequence loading. The unit controller shall continually monitor all input and output points on the unit controller and to maintain proper operation. The unit shall continue to operate in a trouble mode or shut down as necessary to prevent an unsafe condition for the building occupants or to prevent damage to the equipment. In the event of a unit shutdown or alarm, the operating conditions, date, and time shall be stored in the shutdown history to facilitate service and troubleshooting.

5. **Controls and Building Automation System (BAS) Communications**

   BACnet® MS/TP (RS-485) or Modbus™: The unit shall include BACnet® or Modbus™ communications directly from the unit controller. Equipment that is not native BACnet at the unit control board shall include any necessary interface or translator device factory-mounted and wired within the unit. If a field-installed gateway device is required by the manufacturer, the manufacturer shall include all necessary materials, equipment, service, and commissioning of the gateway. A control points list, protocol implementation conformance statement (PICS), and BACnet interoperability building blocks (BIBBs) statement shall be provided by the manufacturer to facilitate communications programming with the BAS. Programming, establishing communications, and commissioning shall be the responsibility of the installing controls contractor. Start-up assistance and support may be purchased from the manufacturer.

   Analog inputs: 0–5VDC inputs shall be provided for remote reset of SAT and duct static pressure.

   Binary inputs: Dry (or "wet") contacts shall be provided for alarm outputs for supply fan fault, cooling/heating fault, or general/sensor faults. Contacts shall also be provided for occupied/unoccupied (start/stop) switching; shutdown, smoke purge, exhaust or pressurization operations; call for cooling or heating; and for morning warm-up.

EXECUTION

Installation

General: Installing contractor shall install unit(s), including components and controls required for operation, in accordance with unit manufacturer's written instructions and recommendations. Units shall be installed as specified.

1. Unit(s) specified shall include a protective covering membrane for such equipment being shipped by truck, rail, or ship. The membrane is fully formed around the equipment exterior. The membrane covers the entire top, side, and end panel surface as to protect the product effectively during shipping and storage, including long term storage. Storing on the job site shall no longer require the unit(s) to be covered with a tarp as long as the covering membrane has not been removed.
2. All size or shape equipment including electrical components, especially those not built with weatherproof enclosures, VFDs, and end devices shall be effectively covered for protection against rain, snow, wind, dirt, sun fading, road salt/chemicals, rust, and corrosion during shipping cycle. Equipment shall remain clean and dry.
3. Manufacturers of units not having a protective membrane fully formed around the equipment exterior, covering the entire top, side, and end panel surface area shall be required to ship equipment covered with a tarp, in crating, or in a closed truck as is necessary to ensure product protection from road salt/chemicals damage, moisture, and dirt infiltration. Arrangements for long term storage at the job site shall be required.

Location: Locate the single package unit as indicated on drawings, including cleaning and service maintenance clearance per manufacturer instructions. Adjust and level the single package unit on support structure.

INSPECTION AND START-UP SUPERVISION

A factory-trained service representative of the manufacturer shall supervise the unit start--up and application specific calibration of control components.

NOTES